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MANKO | GOLD | KATCHER | FOX LLP**AN ENVIRONMENTAL AND ENERGY LAW PRACTICE**

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Admitted in PA, DC and NY

October 13, 2014

Via Overnight Mail

Arlene Lilly, Enforcement Specialist
U.S. Environmental Protection Agency
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Superfund Division - Enforcement & Compliance Assurance Branch
Enforcement Services Section 1, SE-5J
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PHILADELPHIA, PA
*CHERRY HILL, NJ
WILLIAMSPORT, PA
by appointment only

*Partner responsible - Bruce S. Katcher

Re: Response of Halliburton Energy Services, Inc. to EPA Information Request Under
Section 104(e) of CERCLA and Sections 308 AND 311 of the CWA

Dear Ms. Lilly:

Enclosed please find the response of Halliburton Energy Services, Inc. ("HESI") to a request for information (the "Information Request") received from the United States Environmental Protection Agency ("EPA") under a cover letter dated August 25, 2014, pursuant to Section 104(e) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9604(e), and Sections 308 and 311 of the Clean Water Act ("CWA"), 33 U.S.C. §§ 1318 and 1321, related to the Statoil Eisenbarth Well Response Site located at 42240 Long Ridge Road, Clarington, Ohio (the "Site"). While the Information Request required a response within fourteen calendar days of HESI's receipt of the Information Request, EPA subsequently extended the deadline for response to October 13, 2014, as confirmed in an e-mail from counsel for EPA to counsel for HESI dated September 4, 2014.

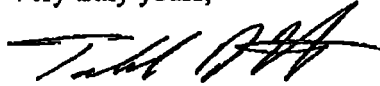
Please note that HESI considers some of the materials being provided in response to this request to constitute confidential business information or trade secrets. In accordance with Enclosure A of the Information Request, these materials are identified with a "CBI" prefix and are being provided in a separate binder.

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Arlene Lilly, Enforcement Specialist
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If you have any questions about the enclosed response or documents, please do not hesitate to contact me.

Very truly yours,

A handwritten signature in black ink, appearing to read "Todd D. Kantorczyk", with a stylized flourish at the end.

Todd D. Kantorczyk
For MANKO, GOLD, KATCHER & FOX, LLP

TDK/dem/10671/0044
Enclosures

**RESPONSE OF HALLIBURTON ENERGY SERVICES, INC. TO
EPA INFORMATION REQUEST UNDER SECTION 104(E) OF CERCLA AND
SECTIONS 308 AND 311 OF THE CWA**

Halliburton Energy Services, Inc. ("HESI") hereby responds to a request for information (the "Information Request") received from the United States Environmental Protection Agency ("EPA") under a cover letter dated August 25, 2014, pursuant to Section 104(e) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 9604(e), and Sections 308 and 311 of the Clean Water Act ("CWA"), 33 U.S.C. §§ 1318 and 1321, related to the Statoil Eisenbarth Well Response Site located at 42240 Long Ridge Road, Clarington, Ohio (the "Site"). While the Information Request required a response within fourteen calendar days of HESI's receipt of the Information Request, EPA subsequently extended the deadline for response to October 13, 2014, as confirmed in an e-mail from counsel for EPA to counsel for HESI dated September 4, 2014.

The Information Request contains a series of 63 questions (many with subparts) relating to the release or threat of release of hazardous substances, pollutants or contaminants at the Site and the discharge of oil and/or potentially hazardous substances from the Site as a result of a fire incident that occurred at the Site on June 28, 2014. In addition, the Information Request includes as an attachment a series of definitions for particular terms that are used in the Information Request. For ease of review, HESI has organized its response to the Information Request to reflect the particular questions posed in the Information Request. Specifically, each of the questions contained in the Information Request is set forth verbatim below in bold type followed by narrative responses to those questions (or groups of questions) in normal type. Documents that are included with the response to the Information Request are similarly organized to correspond to the questions contained in the Information Request. All times are provided in military format using the 24-hour clock.

In addition, the response to the Information Request includes general objections, qualifications and clarifications set forth immediately below. These general objections, qualifications and clarifications are incorporated by reference to the extent applicable to each of the individual responses to the questions contained in the Information Request. Given the breadth of the Information Request and the limited time period afforded by EPA to respond to the Information Request, HESI reserves the right to supplement this response as appropriate.

**GENERAL OBJECTIONS, CLARIFICATIONS, QUALIFICATIONS AND
RESERVATIONS OF RIGHTS**

1. HESI construes its obligation to respond to the Information Request as coextensive with the scope of EPA's authority pursuant to Section 104(e) of CERCLA and Sections 308 and 311 of the CWA, and has interpreted the Information Request under the premise that the Information Request is reasonably related to information relevant to EPA's lawful objectives pursuant to Section 104(e) of CERCLA and Sections 308 and 311 of the CWA. HESI objects to the Information Request to the extent that the Information Request, including "Definitions" and "Instructions" contained therein, purports to impose on HESI obligations beyond those required under Section 104(e) of CERCLA and Sections 308 and 311 of the CWA.

2. HESI objects to the Information Request to the extent that it seeks information or documents that are protected from disclosure by the attorney-work product doctrine, the privilege associated with attorney-client communications, and/or other applicable confidentiality protections and privileges. HESI specifically reserves all legally recognized privileges protecting from disclosure documents and information, including, without limitation, the attorney-client privilege and the attorney work product doctrine. HESI does not waive any such right or privilege by its response to the Information Request, and hereby specifically asserts such privileges and protections.

3. HESI objects to the Information Request to the extent that it seeks information that is not in HESI's possession, custody or control. Additionally, HESI does not routinely maintain documents or other information, except as required by and/or specified in, applicable regulations or other recordkeeping standards or requirements. HESI has undertaken an investigation designed to identify reasonably available existing information and documents including documents routinely maintained by HESI or required to be maintained under applicable law. Such information and documents form the basis for HESI's response.

4. HESI reserves the right to supplement, modify and/or amend its response to the Information Request if new or additional information becomes available, and does not waive any available objections to the Information Request by providing this response.

5. Based upon its review of the Information Request, HESI regards individual components of the Information Request as vague or ambiguous. By way of example only, the Information Request is vague or ambiguous to the extent that the Information Request does not define various terms or purports to define terms other than by their commonly understood meaning. HESI specifically states that it has provided responses to the Information Request based upon HESI's understanding of the requests and the common usage of specific terms not otherwise defined.

6. HESI objects to the Information Request to the extent that any individual request is overly broad or not reasonably calculated to lead to the production of relevant information pertinent to the Site, and/or that responding thereto would be unduly burdensome or expensive.

7. HESI objects to the Information Request to the extent that references in the Information Request to "Respondent," "Halliburton," "you" or "your" are intended to encompass entities other than HESI. HESI has responded to the Information Request with the understanding that such references refer solely to HESI.

8. HESI objects to the Information Request to the extent that it purports to impose on HESI a duty to respond in a manner that exceeds HESI's obligations under Section 104(e) of CERCLA or Section 308 and 311 of the CWA, including, without limitation, any express or implicit requirement by EPA for HESI to supplement its response. Notwithstanding any direction from EPA to the contrary, HESI has undertaken to provide its response in the manner and to the extent required by Section 104(e) of CERCLA and Sections 308 and 311 of the CWA, and consistent with HESI's objectives of cooperatively working with EPA.

9. Enclosure A states that any business confidentiality claim asserted by HESI should be supported by the submission of information consistent with 40 C.F.R. Part 2. HESI does not believe that 40 C.F.R. §2.203 requires businesses to submit "support" for a business confidentiality claim at the time the claim is asserted. Rather, in accordance with 40 C.F.R. §2.204(e), a business that has asserted a confidentiality claim must be afforded the opportunity to comment if and when EPA is required to make a determination that the information at issue is entitled to confidential treatment.

10. Nothing in this response is intended to waive, restrict or otherwise impair any arguments or defenses to liability under CERCLA, the CWA or otherwise that HESI may have, and HESI hereby expressly preserves its rights and ability to raise any and all such arguments and defenses. HESI also reserves the right to assert additional objections to the Information Request.

HESI fully incorporates the foregoing general objections, clarifications, qualifications and reservations of rights into each of its responses to individual sections of the Information Request, and will therefore generally not restate such objections, clarifications, qualifications and reservations of rights within individual responses. In addition, by providing responses to each of the individual sections of the Information Requests, HESI does not thereby waive or limit the foregoing.

Without limitation to the foregoing, HESI's response to the Information Request, completed to the best of its knowledge and information following reasonable inquiry, is set forth below.

PRELIMINARY STATEMENT

HESI is a leading provider of services to the oil and gas industry. As a service provider, HESI is typically engaged as a contractor by the owner or operator of an oil or gas well site to perform certain services at the site. In this instance, Statoil USA Onshore Properties, Inc. ("Statoil") as the operator of the Eisenbarth Well Pad Site hired HESI to perform hydraulic fracturing services for natural gas wells that were previously drilled and constructed by separate contractors hired by Statoil. Statoil hired contractors other than HESI to perform additional services at the Eisenbarth Well Pad Site—including, for example, wellhead construction, wireline services, fluid and flowback management, and fuel supply—at the same time HESI was conducting its hydraulic fracturing services at the Eisenbarth Well Pad Site. As one of many contractors hired by Statoil to conduct distinct services, HESI possesses limited, if any, knowledge about operations at the Eisenbarth Well Pad Site that fall outside the scope of the hydraulic fracturing services provided by HESI. A number of the items in the Information Request concern services provided by other contractors at the Eisenbarth Well Pad Site with respect to which HESI does not have knowledge. Moreover, at all times, the Site has been and remains in Statoil's control, and HESI's hydraulic fracturing services were performed under the direction and supervision of Statoil. As a single contractor providing limited services to Statoil, HESI is not considered to be either the owner or the operator of the Eisenbarth Well Pad Site as those terms are understood under CERCLA, the CWA or other statutes and regulations referenced in the Information Request. Many of the items in the Information Request relate to

permitting, recordkeeping and reporting obligations applicable to owners and operators such as Statoil rather than service providers such as HESI. In all instances, HESI's responses to the items included in the Information Request are consistent with HESI's role as one of many contractors at the Eisenbarth Well Pad Site hired and directed by Statoil.

RESPONSES TO INFORMATION REQUESTS

1. Identify all persons consulted in the preparation of the answers to these Information Requests.

HESI objects to this request on the basis that it is overly broad, unduly burdensome, and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. HESI has undertaken an extensive review of information and documentation in preparing its response to the Information Request. Identifying each individual who was "consulted" as part of this effort would be inefficient, non-responsive, and extremely burdensome. Subject to the foregoing, the following HESI employees were consulted in preparation of the response to the Information Request:

Tony Angelle, Area Vice President, Northeast
Kurt R. Harpold, Jr., Northeast PE Operations Manager
David S. Dumond, Global Manager, Environment
William Weaver, HSE Technical Professional
Stuart H. Kemp, Esq., Senior Director, Health, Safety, and Environmental Law Practice Group

2. Identify all documents consulted, examined or referred to in the preparation of the answers to these Requests, and provide copies of all such documents.

HESI objects to this request on the basis that it is overly broad, unduly burdensome, and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. HESI has undertaken an extensive review of information and documentation in preparing its response to the Information Request. Submission of each document that was "consulted or examined" would be inefficient, non-responsive, and extremely burdensome. In contrast to EPA's very general and overly broad request for documents set forth above, EPA has elsewhere in the Information Request made much more specific requests for particular documents. HESI submits herewith those documents that contain information that is relevant and responsive to such individual information requests. Further, where multiple documents may contain the same or substantially similar responsive information, HESI has submitted the document or documents that, in its view, best responds to the individual request. However, HESI has not produced herein those documents that are not relevant to the Information Request, contain legally protected or privileged information, or are not reasonably related to EPA's authority under Section 104(e) of CERCLA or Sections 308 and 311 of the CWA.

Subject to the foregoing, HESI has included with this response an index that lists the documents provided with HESI's response to the Information Request.

3. **If you have reason to believe that there may be persons able to provide a more detailed or complete response to any Information Request or who may be able to provide additional responsive documents, identify such persons.**

Except as noted in the response to any individual request, HESI does not believe that there may be persons able to provide a more detailed or complete response to any request or may be able to provide additional responsive documents.

4. **List the EPA Identification Numbers of the Respondent.**

HESI objects to the Information Request as overbroad, unduly burdensome and irrelevant, in particular because the request is not, on its face, limited to the Site. As a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil, HESI was not assigned an EPA Identification Number for purposes of its work at the Site. To the extent that this Information Request seeks HESI's EPA Identification Numbers for operations at locations other than the Site, and seeks information that is already in EPA's possession.

5. **List the Standard Industrial Classification Code of the Respondent.**

The Standard Industrial Classification Code of HESI is 1389, Oil and Gas Field Services.

6. **Provide the number of employees employed by Respondent.**

As of September 2014, HESI employed approximately 82,479 people globally.

7. **If Respondent was a subsidiary or division of a corporation at any time from January 1, 2011 to the present, identify the corporation (parent corporation if a subsidiary), and provide copies of pertinent documents supporting the relevant relationship.**

HESI is a wholly owned subsidiary of Halliburton Company. Exhibit 21.1 to the annual 10-K report filed by Halliburton Company with the United States Securities and Exchange Commission ("SEC") for the fiscal year ending as of December 31, 2013, lists Halliburton Energy Services, Inc. as a subsidiary of Halliburton Company. A copy of the annual 10-K report is attached hereto.

8. **State the dates which you owned, operated or leased the Site and provide copies of all documents evidencing or relating to such ownership, operation or lease arrangement (e.g., deeds, leases, etc.).**

HESI has never owned, operated or leased the Site.

9. **If portions of the Site are owned by entities other than you, identify those entities and what portion of the Site they own.**

HESI does not possess particular information concerning the ownership status of the Site. As a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil, HESI understands that Statoil controls the Site through ownership or contract.

10. **Identify the current operators, including lessors, of the Site. For each such operator, further identify:**

- a. **The dates of operation;**
- b. **The nature of its operations at the Site;**
- c. **The portion of the Site it operates; and**
- d. **All evidence that they controlled access to the Site.**

HESI was hired by Statoil as a contractor to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil. At the time that HESI was performing such services at the Site, the Site was a natural gas well pad under the control of Statoil. HESI does not possess additional information concerning the items in this request.

11. **Provide copies of all local, state and federal environmental permit applications and permits ever granted for the Site or any part thereof (c.g., RCRA permits, National Pollutant Discharge Elimination System permits, CWA Section 401 Water Quality Certification, CWA Section 404 Permits, and/or Underground Injection Control permits, etc.). If the facility applied for a "no discharge" or other permit exemption under such permits, please provide a copy of such application.**

As a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil, HESI was not required to obtain any local, state or federal permits for the Site, and therefore HESI does not possess any environmental permits or permit applications for the Site.

12. **Provide all reports, information or data related to soil, water (ground and surface) or air quality and geology/hydrogeology at and about the Site. Provide copies of all documents containing such data and information, including both past and current aerial photographs as well as documents containing analysis or interpretation of such data.**

HESI objects to this Information Request as overly broad, unduly burdensome, and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the forgoing, HESI responds that after the fire incident but before HESI began equipment removal activities, HESI requested that Statoil's environmental consultant, CTEH, obtain and analyze soil samples from six

locations at the Site. The analytical results and a figure indicating where the soil samples were collected are included with this response.

- 13. Identify all persons having knowledge or information about the generation, transportation, treatment, disposal or other handling of hazardous substances by you, your contractors or by prior owners and/or operators at the Site.**

HESI objects to this Information Request as overly broad, unduly burdensome, and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Over 60 HESI employees were assigned to the crew that performed hydraulic fracturing services at the Site, and each of their individual job responsibilities may have required at some point "handling" of hazardous substances at the Site. Furthermore, other HESI employees not specifically assigned to the crew may have provided support services at some point concerning hazardous substances that were used at the site. Finally, as a contractor hired by Statoil to perform hydraulic fracturing services at the Site, HESI does not have information about prior owners and/or operators of the Site.

Subject to the foregoing, HESI responds that the following HESI personnel may have the most broad-based knowledge or information about the generation, transportation, treatment, disposal or other handling of hazardous substances at the Site by HESI:

Tony Angelle, Area Vice President, Northeast
Kurt R. Harpold, Jr., Northeast PE Operations Manager
Bradley Evans, Real Estate Services Manager
William Weaver, HSE Technical Professional
Richard (Lee) Cox, Field Service Manager

- 14. Did you ever use, purchase, store, treat, dispose, transport or otherwise handle any hazardous substances, materials, pollutants or contaminants, oil, petroleum, or petroleum products (for this question "material") at the Site? If the answer to the preceding question is anything but an unqualified "no", identify for each material:**
- a. The chemical composition, characteristics (including toxicity), physical state (e.g., solid, liquid);**
 - b. The supplier;**
 - c. How it was used, purchased, generated, stored, treated, transported, disposed or otherwise handled by you;**
 - d. When it was used, purchased, generated, stored, treated, transported, disposed or otherwise handled by you;**
 - e. Where it was used, purchased, generated, stored, treated, transported, disposed or otherwise handled by you;**

- f. The quantity that was used, purchased, generated, stored, treated, transported, disposed or otherwise handled by you.**

HESI objects to this request as overly broad, unduly burdensome, and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Operations at the Site between June 19, 2014, and June 28, 2014, were very dynamic and therefore in the absence of the identification of a specific point in time, responses to the individual items listed above cannot be provided. Subject to the foregoing, the HESI materials in use at the Site on June 28, 2014 and associated operations were typical of the HESI materials in use at the Site and operations at the Site between June 19, 2014 and June 28, 2014. Accordingly, please see HESI's responses to Request No. 39 and Request No. 40, below, which are incorporated herein by reference.

- 15. Did the Site ever have "interim status" under RCRA? If so, and the Site does not currently have interim status, describe the circumstances under which the Site lost interim status.**

HESI does not know whether the Site has ever had "interim status" under RCRA.

- 16. Did you ever file a notification of hazardous waste activity under RCRA for the Site? If so, provide a copy of such notification.**

HESI has never filed a notification of hazardous waste activity under RCRA for the Site.

- 17. Was Respondent conducting business at the Site during the time period of January 1, 2011 to December 31, 2011?**

No.

If so, please respond to the following information requests.

- a. Did you use, produce, manufacture, and/or store any hazardous chemicals at this location during the period of January 1, 2011 to December 31, 2011?**
- b. If the answer to 17(a) is yes, provide a list of such hazardous chemicals and the maximum quantity stored at the facility at any one given time during the period of January 1, 2011 to December 31, 2011.**
- c. For each hazardous chemical listed in 17(b), provide a Material Safety Data Sheet (MSDS).**
- d. Provide a copy of the Tier One or Tier Two form required under Section 312 of the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. § 11022, for the period of January 1, 2011 to December 31, 2011.**
- e. Did you supply copies of all MSDSs, or a list of hazardous chemicals, for hazardous chemicals stored at this facility above a Threshold Planning Quantity (TRQ) and/or Minimum Threshold Quantity to the Ohio State**

Emergency Response Commission ("Ohio SERC") on or before October 17, 1987, or 90 days from the date the hazardous chemical became present at this facility? If so, provide documentation to support your claim.

- f. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Ohio SERC for the period of January 1, 2011 to December 31, 2011, on or before March 1, 2012? If so, provide documentation to support your claim.**
- g. Did you supply copies of all MSDSs, or a list of hazardous chemicals, for hazardous chemicals stored at this facility above a Threshold Planning Quantity (TPQ) and/or Minimum Threshold Quantity to the Monroe County Local Emergency Planning Committee (Monroe County LEPC) on or before October 17, 1987, or 90 days from the date the hazardous chemical became present at this facility? If so, provide documentation to support your claim.**
- h. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Monroe County LEPC for the period of January 1, 2011 to December 31, 2011, on or before March 1, 2012? If so, provide documentation to support your claim.**
- i. Did you supply copies of all MSDSs, or a list of hazardous chemicals, for hazardous chemicals stored at this facility above a Threshold Planning Quantity (TPQ) and/or Minimum Threshold Quantity to the Clarington Fire Department on or before October 17, 1987, or 90 days from the date the hazardous chemical became present at this facility? If so, provide documentation to support your claim.**
- j. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Clarington Fire Department for the period of January 1, 2011 to December 31, 2011, on or before March 1, 2012? If so, provide documentation to support your claim.**

- 18. Was Respondent conducting business at the Site during the time period of January 1, 2012 to December 31, 2012?**

No.

If so, please respond to the following information requests.

- a. Did you use, produce, manufacture, and/or store any hazardous chemicals at this location during the period of January 1, 2012 to December 31, 2012?**
- b. If the answer to subparagraph (a) is yes, provide a list of such hazardous chemicals and the maximum quantity stored at the facility at any one given time during the period of January 1, 2012 to December 31, 2012.**

- c. For each hazardous chemical listed in subparagraph (b), provide a Material Safety Data Sheet (MSDS). If you already provided an MSDS for a hazardous chemical in response to Question 17, you need not provide another one for the same hazardous chemical.
- d. Provide a copy of the Tier One or Tier Two form required under Section 312 of the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. § 11022, for the period of January 1, 2012 to December 31, 2012.
- e. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Ohio SERC for the period of January 1, 2012 to December 31, 2012, on or before March 1, 2013? If so, provide documentation to support your claim.
- f. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Monroe County LEPC for the period of January 1, 2012 to December 31, 2012, on or before March 1, 2013? If so, provide documentation to support your claim.
- g. Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Clarington Fire Department for the period of January 1, 2012 to December 31, 2012, on or before March 1, 2013? If so, provide documentation to support your claim.

19. Was Respondent conducting business at the Site during the time period of January 1, 2013 to December 31, 2013?

No.

If so, please respond to the following information requests.

- a. Did you use, produce, manufacture, and/or store any hazardous chemicals at this location during the period of January 1, 2013 to December 31, 2013?
- b. If the answer to subparagraph (a) is yes, provide a list of such hazardous chemicals and the maximum quantity stored at the facility at any one given time during the period of January 1, 2013 to December 31, 2013.
- c. For each hazardous chemical listed in subparagraph (b), provide a Material Safety Data Sheet (MSDS). If you already provided an MSDS for a hazardous chemical in response to Question 17, you need not provide another one for the same hazardous chemical.
- d. Provide a copy of the Tier One or Tier Two form required under Section 312 of the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. § 11022, for the period of January 1, 2013 to December 31, 2013.

- e. **Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Ohio SERC for the period of January 1, 2013 to December 31, 2013, on or before March 1, 2014? If so, provide documentation to support your claim.**
 - f. **Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Monroe County LEPC for the period of January 1, 2013 to December 31, 2013, on or before March 1, 2014? If so, provide documentation to support your claim.**
 - g. **Did you supply a copy of each and every Tier One or Tier Two form provided under subparagraph (d) above to the Clarington Fire Department for the period of January 1, 2013 to December 31, 2013, on or before March 1, 2013? If so, provide documentation to support your claim.**
20. **For the five years prior to this Information Request, did the Site have more than a total of 1,320 gallons of oil stored in tanks, bunkers, drums, totes, transformers, pails, or other storage containers that are not buried?**

To the extent this request seeks information about operations at the Site performed by entities other than HESI, HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds as follows:

As a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil starting on June 19, 2014, HESI does not have sufficient information in its possession, custody or control to answer this question. HESI estimates that at the time of the incident on June 28, 2014, HESI's sixteen hydraulic fracturing pumps held a total of 8,500 gallons of diesel fuel, and Pilot Fuels Logistics ("Pilot") operated two diesel tankers on the Site, one of which held 1,100 gallons of diesel fuel and the other of which held 700 gallons of diesel fuel. All diesel fuel was supplied by Statoil.

21. **Identify the total oil storage capacity of the Site in gallons. If this has changed since operations began at the Site, explain how and when.**

See HESI's response to Request No. 20, above, which is incorporated herein by reference.

22. **Provide a list of oil storage containers and the maximum storage capacity of each oil storage container at the Site for five years prior to June 28, 2014.**

See HESI's response to Request No. 20, above, which is incorporated herein by reference.

23. **Did the Site have a Spill Prevention, Control and Countermeasures Plan as required by the regulation at 40 C.F.R. § 112.3? If so, submit a copy of the plan, including**

the certification by a Professional Engineer as required by the regulation at 40 C.F.R. § 112.3(d), documentation of full approval of the plan by management as required by the regulation at 40 C.F.R. § 112.7, and a description of any amendments to the plan made pursuant to the regulation at 40 C.F.R § 112.4.

As a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil, HESI did not prepare a Spill Prevention, Control and Countermeasures Plan ("SPCC Plan") for the Site.

- 24. If the answer to the preceding question is yes, identify when the Site first implemented a Spill Prevention, Control and Countermeasures Plan.**

HESI does not have knowledge concerning if or when the Site first implemented an SPCC Plan.

- 25. Submit copies of any reports of spills required to be reported by Ohio Revised Code 3745.50 for the past 5 years.**

As a threshold matter, HESI notes that "Ohio Revised Code 3745.50" does not appear to exist. HESI assumes that EPA intended to refer to Ohio Revised Code 3750.06, which is entitled "Notice of Release of Hazardous Substance."

To the extent this Information Request seeks information about locations other than the Site, or spills required to be reported by entities other than HESI, HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds that HESI was hired as a contractor by Statoil to provide hydraulic fracturing services and first arrived at the Site on June 19, 2014. Since that time, HESI has not been required to report any spills at the Site pursuant to Ohio Revised Code 3750.06 because HESI is not an "owner or operator" of the Site.

- 26. Provide a copy of the emergency plan that outlines the procedures for notification of accidental releases at the Site.**

HESI has adopted a Global Health, Safety and Environmental ("HSE") Standard entitled "Spill Management," which establishes internal procedures for reporting spills. A copy of that standard is included with this response. Consistent with that standard, with respect to customer work site locations such as the Site, HESI coordinates with the customer to ensure that appropriate notifications are made in the case of an accidental release.

- 27. How many employees are employed by Respondent at the Eisenbarth Well Pad in Clarington, Ohio?**

HESI assigned 61 employees to the crew that was providing hydraulic fracturing services to Statoil at the Site. At the time of the fire incident on June 28, 2014, 19 HESI

employees were present at the Site. Currently, HESI has no employees performing hydraulic fracturing services at the Site.

- 28. Provide documentation regarding the training of employees at the Site on the procedures for notification of accidental releases at the Site.**

HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what is meant by "documentation regarding the training of employees." Subject to the foregoing, HESI responds as follows:

HESI employees who could impact the environment in their daily work are required to complete a training course entitled "Environmental Awareness & Incident Reporting." The course provides an overview of potential impacts on the environment associated with HESI's activities and possible solutions of how those potential environmental impacts can be eliminated or controlled. HESI has included with this response copies of materials from that training course.

- 29. Describe the status of all wells on the Site other than Well #7, including the casings inside them and any other measures taken to seal those wells.**

HESI does not possess information concerning the current status of any of the wells on the Site, including any measures that may have been taken to seal those wells.

- 30. Describe the operations at the Site generally and specifically the operations taking place in the ten days prior to and including June 28, 2014. Include the following information in your description:**

To the extent this Information Request seeks information about operations at the Site performed by entities other than HESI, HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds as follows:

HESI personnel first arrived at the Site on June 19, 2014, and began to rig up. The first pumping operations in which HESI participated commenced on June 21, 2014, and consisted of initiating the toe sleeve on Well #6H. Once open, wireline operations began on Well #6H for the first stage. Well #6H was then perforated, and pumping of hydraulic fracturing fluid began on the first stage of Well #6H on June 22, 2014. The toe sleeves on Well #7H and Well #5H were initiated and the wells were perforated on June 22, 2014. The first stage of pumping of hydraulic fracturing fluid for those wells was also completed on June 22, 2014. Between June 22, 2014 and June 28, 2014, subsequent stages of Well #6H, Well #7H and Well #5H were completed in the same manner. The order of well stages perforated and completed were as follows: 6H Stage 2, 5H Stage 2, 5H Stage 3, 6H Stage 3, 7H Stage 2, 7H Stage 3, 6H Stage 4, 5H Stage 4, 7H Stage 4, 7H Stage 5, 6H Stage 5, 5H Stage 5, 7H Stage 6, 5H Stage 6, 6H Stage 6, 7H Stage 7, 5H

Stage 7, and 5H Stage 8. On the morning of June 28, 2014, Well #7H Stage 8 was in the process of being perforated when the incident occurred.

HESI's specific responses to items a through f are provided below:

- a. The identity of the shale that was being hydraulically fractured at Well #7H (e.g. Utica, Marcellus);**

Marcellus.

- b. The depth of the vertical well at Well #7H at 9:00am EDT on June 28 2014;**

Well #7H is a horizontal well rather than a vertical well. At 0900 EDT on June 28, 2014, wireline was being pumped down Well #7H in preparation for perforation of Stage 8 of Well #7H. The depth of the perforations to be shot at that time had a true vertical depth of approximately 6,400 feet with a measured depth of approximately 11,400 feet.

- c. The number of horizontal arms planned for Well #7H;**

One.

- d. The number of horizontal arms completed at Well #7H at 9:00 am EDT on June 28, 2014;**

At 0900 EDT on June 28, 2014, well completion activities were underway on the only horizontal arm of Well #7H.

- e. Please specify the stage of the process for each of the horizontal well arms identified in c. and d. above; and;**

See HESI's responses, above.

- f. The disposal or planned disposal of the hydraulic fracturing fluid after its use.**

The hydraulic fracturing services provided by HESI to Statoil did not include disposal of hydraulic fracturing fluid after its use. As the operator of the Site, disposal of hydraulic fracturing fluid after its use at the Site was the responsibility of Statoil.

31. **Please provide a list of all drinking water wells within 2.5 miles of any of the horizontal arms identified in Question 30(c) above. Please provide copies of any sampling and analyses conducted at the drinking water wells or other drinking water intakes that Halliburton conducted prior to construction of the wells to after the June 28, 2014 incident.**

HESI does not possess any information related to drinking water wells within 2.5 miles of the horizontal arm of Well #7H. HESI did not conduct any sampling of any drinking water wells or other water intakes as part of any operations associated with the Site prior to June 28, 2014, nor has HESI conducted any such sampling since that time.

32. **Describe the blender operations at the Site. Submit any standard operating procedures and manufacturer recommendations or specifications for those operations.**

The purpose of the blender is to combine water, chemicals, and proppant into a complete fluid system utilized in the hydraulic fracturing process. This fluid system is then directed under pressure to a manifold trailer, which in turn distributes the fluid into multiple pump trucks to be pumped under pressure into the well to be stimulated. HESI has included with this response an Operations Manual for the model of blender (FB4K) in use at the Site at the time of the incident. Please note that HESI considers this Operations Manual to be confidential business information. In accordance with Enclosure A of the Information Request, these materials are identified with a "CBI" prefix and are being provided in a separate binder.

33. **Describe any preventative maintenance that was performed on the blenders prior to operation, including lubricating oil use logs. Submit any manufacturer recommendations or specifications for maintenance of the blenders.**

HESI objects to this Information Request as vague and overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA, specifically because it does not specify what time period encompasses "prior to operation." Subject to the foregoing, HESI has included with this response documents that reflect maintenance that was performed on the two blenders which were present at the Site on June 28, 2014, during the 60 days preceding that date. Those documents include two spreadsheets that list the maintenance performed on the primary blender (Equipment #11149190) and the backup blender (Equipment #11124263). In addition, HESI has included "Preventive Maintenance Check Sheets" completed for those blenders during that 60 day time period prior to June 28, 2014. Finally, HESI has included the HESI Test Procedure for an FB4K blender, dated March 7, 2013, which includes test results for the primary blender. Please note that HESI considers the Test Procedure to be confidential business information. In accordance with Enclosure A of the Information Request, these materials are identified with a "CBI" prefix and are being provided in a separate binder.

34. Submit training records or training certification for personnel operating the blenders on June 28, 2014.

HESI objects to this Information Request as vague and overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA, specifically because it does not specify what constitutes "training records or training certifications." Subject to the foregoing, HESI responds as follows:

HESI employees are required to undergo extensive training based upon their positions and experience. Records of training completed and competencies achieved by each HESI employee are maintained by HESI in an online database. Included in this response are screen shots of the competencies held by Tony Beck, the blender operator operating the blender at 0900 EDT on June 28, 2014.

35. Describe the water life cycle of the fracturing process. The water "lifecycle" includes obtaining and transporting the water to the Site, following by its storage and use in the hydraulic stimulation process during the completions phase of a well. Please include:

- a. A list of all additives to the fracturing fluid before injection;
- b. A description of any sampling of the fluid prior to injection;
- c. A description of any sampling of flowback fracturing fluid conducted post injection;
- d. A description of all waste disposal methods for flowback fracturing fluid stored onsite (for example: trucked to a pre-treatment facility, disposed of at underground injection well, treated and reused at future sites, etc.); and
- e. A list of sites that accept the flowback fracturing fluid waste for treatment or disposal, if used.

HESI objects to this request as vague and overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA, specifically with respect to the phrase "water life cycle of the fracturing process" or to the extent this Information Request seeks information about operations at the Site performed by entities other than HESI. Subject to the foregoing, HESI responds as follows:

The hydraulic fracturing services provided by HESI to Statoil at the Site did not include obtaining and transporting water to the Site, storage of water at the Site, or disposal or reuse of hydraulic fracturing fluid after its use. As the operator of the Site, Statoil was responsible for these operations. Statoil provided all water used at the Site by HESI in conjunction with hydraulic fracturing services.

The following is a list of the additives that HESI added to the fracturing fluid at the Site before injection:

Hydrochloric acid
GasPerm 1000
BE-9
WG-36
FR-66
SP Breaker
Sand

Each additive listed above was utilized at some point during the hydraulic fracturing process at the Site. HESI did not conduct any sampling of the hydraulic fracturing fluid prior to injection or of the flowback fracturing fluid post injection.

- 36. Identify the amount of hydraulic fracturing fluid that had been pumped down Well #7H as of 9:00 am EDT on June 28, 2014.**

HESI objects to this request as unduly burdensome and outside the scope of EPA's information gathering authority under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, please see HESI's response to Request No. 37, below, which is incorporated herein by reference.

- 37. Identify the total amount of each component of the fluid pumped down Well #7H as of 9:00 am EDT on June 28, 2014. Provide any analytics or sampling results of this fluid if it is available.**

HESI objects to this request as unduly burdensome and outside the scope of EPA's information gathering authority under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds as follows:

HESI typically monitors in real time the amount and certain characteristics of hydraulic fluid that is pumped down a well as part of hydraulic fracturing operations. For an additional fee, HESI's customers can request that HESI record and store these data electronically at an offsite location. Statoil did not request that HESI provide this additional service. Accordingly, all HESI data concerning the amount of hydraulic fracturing fluid that had been pumped down Well #7H as of 0900 EDT on June 28, 2014, were consumed in the fire incident. Based upon other operational information, HESI has estimated that the following amounts of each component were pumped down Well #7H as part of the hydraulic fracturing fluid system:

Water (provided by Statoil): 2,433,210 gallons

Sand:

100 mesh - 280,900 lbs.

30/50 - 2,078,000 lbs.

20/40 - 712,300 lbs.

Hydrochloric acid (7.5%): 30,000 gallons

HAI-OS Inhibitor: 30 gallons

FR-66: 1,723 gallons

BE-9: 1,229 gallons

SP Breaker: 75 lbs.

GasPerm1000: 4,583 gallons

WG-36: 27,961 lbs.

Please note that the HAI-OS inhibitor is a corrosion inhibitor that was blended into the acid blend before it arrived at the Site.

38. **Describe how BE-9 is used on the Site. Identify the frequency with which BE-9 is used in the hydraulic fracturing process and the concentration in which it is used in the mixed hydraulic fracturing fluids.**

BE-9 is a biocide that is utilized to kill bacteria that are known to produce hydrogen sulfide gas (H₂S). BE-9 is pulled from a chemical tote through the chemical line, and is injected through a liquid additive pump into the fluid stream in the blender. BE-9 is typically injected into the fluid stream at a concentration of 0.25 to 0.5 gallons per thousand gallons of water. To the best of HESI's knowledge, BE-9 was employed at the Site consistent with the foregoing process.

39. **Submit a diagram of the Site on the morning of June 28, 2014 showing the location of all storage containers for oil, hazardous substances, hazardous chemicals, extremely hazardous chemicals, and materials, including containers stored in van trailers.**

To the extent that this Information Request seeks information about operations at the Site performed by entities other than HESI or equipment owned or operated by entities other than HESI, HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds as follows:

HESI has included with this response a figure produced by HESI employees, dated July 8, 2014, that depicts the approximate location of equipment at the Site as of 0900 on June 28, 2014. All amounts of materials indicated on the figure are estimates.

40. **Submit a list of the amounts of oil, hazardous substances, hazardous chemicals, extremely hazardous chemicals, and materials stored on the Site on the morning of June 28, 2014 and how much of each listed item was recovered after response activities to the fire finished on or about July 1. Indicate where each listed item was**

stored by linking the list to the diagram submitted pursuant to Question #39. Submit an MSDS for each material listed and product labels listing all ingredients of each material listed.

To the extent this Information Request seeks information about operations at the Site performed by entities other than HESI or equipment owned or operated by entities other than HESI, HESI objects to this Information Request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds as follows:

HESI has included with this response a spreadsheet which it prepared on or about July 2, 2014, that lists: (a) the estimated volume of HESI's materials at the Site at the time of the incident; and (b) the estimated volume of HESI's materials left at the Site on or about July 1, 2014. HESI has also included the material safety data sheets ("MSDSs") for each of the chemicals or products listed in the spreadsheet where there was a loss, except for diesel fuel. The product labels for these materials are affixed to containers. Accordingly, HESI has included digital photos of these labels. The diesel fuel was supplied by Pilot, a Statoil contractor, and thus Pilot would be in the best position to provide an MSDS and label information for that product. As noted in the response to Request No. 39, above, HESI has included with this response a figure produced by HESI employees dated July 8, 2014, that depicts the approximate location of equipment at the Site as of 0900 EDT on June 28, 2014, and estimates of the amounts of HESI's materials present in each piece of equipment.

- 41. Identify and describe in detail the series of events that caused the fire and subsequent explosions at the Site on June 28, 2014. Identify all persons, including contractors, with information about the cause of the fire. Submit any "root cause" analyses or any report that details the cause of the fire at the Site that began on June 28, 2014.**

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what EPA considers to be an "event[]" that caused the fire" for purposes of this response. Furthermore, HESI objects to what appears to be EPA's position that HESI or any other person can determine a specific "cause" of the fire incident at the Site to a reasonable degree of certainty. In addition, HESI objects to this request to the extent it seeks information or documents that are protected from disclosure by the attorney-work product doctrine, the privilege associated with attorney-client communications, and/or other applicable confidentiality protections and privileges. Finally, the investigation into this incident is ongoing, and HESI reserves the right to supplement this response if additional facts become available concerning the cause of the fire at the Site on June 28, 2014. Subject to the foregoing, HESI responds as follows:

The area of origin of the fire incident at the Site appears to be the west side of the primary (down hole) blender in the immediate vicinity of the hydraulic unit for the

blender. This hydraulic unit was located aft of the blender's diesel powered deck engine and forward of the blender control room. While most of the normally discernible fire development patterns in the area of the primary blender were damaged extensively by the fire, the patterns of fire damage are consistent with the west side of the primary blender being the general area of origin of the fire. This location of the origin of the fire is also consistent with eyewitness accounts from HESI employees who were present at the Site at the time of the fire incident.

The first individual to observe the fire at the Site was the blender operator, Tony Beck. Mr. Beck indicated that while inside the blender control room during blender operations around 0900 EDT on June 28, 2014, he felt a vibration of the equipment. He then checked the gauge panel and no obvious problem was indicated. Mr. Beck then proceeded to check the intake suction hoses at ground level on the east side of the blender to ensure that the blender was not experiencing a water supply issue. While checking these intake hoses, Mr. Beck observed liquid dripping from the trailer deck (east side) in the vicinity of the hydraulic unit, which was south of his position. Mr. Beck estimated the flow of this liquid to be approximately one half gallon per minute. Mr. Beck immediately proceeded to the deck level of the blender unit. While approaching the control room, he observed flames extending approximately two feet above and behind the gauge panel which was just forward (south) of the control room. Mr. Beck then entered the control room and hit the "emergency stop" button. He then used his radio to report a fire in the blender. Next, he retrieved a nearby fire extinguisher from the north side of the platform, and as he approached the gauge panel area, he saw that the flames had grown much higher. At that time, he did not believe that the fire extinguisher would have had any effect on the fire. Upon making this observation, Mr. Beck decided to evacuate the area. He exited the blender platform via the steps on the east side of the unit and proceeded northward between the primary and secondary blender units toward the Sand Castle area where he met with other HESI personnel and continued to evacuate to the muster point at the main entrance of the Site.

Mr. Beck's observations indicate that the initial area of fire was in the immediate vicinity of the hydraulic unit of the blender, and his descriptions of the fire's rapid growth are consistent with the release and ignition of an ignitable liquid. In this observed area of origin, the most prominent source of fuel would have been the inadvertent release of pressurized automatic transmission fluid, which was being used as hydraulic fluid.

The investigation concerning the fire incident at the Site on June 28, 2014, is ongoing, and so no "root cause" or other non-privileged internal incident investigation report currently exists. Included in this response are non-privileged interview statements from thirteen HESI employees taken by HESI Ground Supervisor Bryan Parkin shortly after the fire. Statoil also obtained interview statements from certain HESI employees present at the Site at the time of the fire incident. Please let HESI know if EPA would like copies of these statements, or whether EPA is obtaining them from Statoil.

42. **Identify the acts or omissions of any persons, other than your employees, contractors, or agents that may have caused the release or threat of release of hazardous substances, pollutants or contaminants, or oil from the Site on June 28, 2014 and damages resulting therefrom.**

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what EPA considers to be an "act or omission...that may have caused the release or threat of release" for purposes of this response. Furthermore, HESI objects to what appears to be EPA's position that HESI or any other person can determine a specific "cause" of a release to a reasonable degree of certainty. Finally, the investigation into this incident is ongoing, and HESI reserves the right to supplement this response if additional facts become available concerning the release or threat of release of substances from the Site on June 28, 2014. Subject to the foregoing, HESI responds as follows:

As part of the emergency response to the fire incident at the Site, HESI dispatched three employees to provide support: Richard (Lee) Cox, William Weaver and Michael Ruby. All three HESI employees arrived at the Site by 1330 EDT on June 28, 2014. Initially, the HESI employees provided support to Statoil, the operator in control of the Site, by supplying information about equipment locations and chemicals at the Site. Later in the afternoon, Michael Sherron—the State On-Scene Coordinator from the Ohio EPA Emergency Response Unit—arrived at the Site and began to coordinate with Statoil on the emergency response. From the outset, Mr. Sherron indicated that his primary goal was to prevent another explosion at the Site and requested that Statoil and other contractors at the Site develop a plan to fight the fire. Mr. Sherron eventually focused on preventing the fire from reaching HESI's "Conex" trailer in the southwest corner of the well pad, because he believed that some of the materials in the Conex trailer, in particular an oxidizer, propane tanks, and acetylene tanks, presented a risk of explosion.

Ultimately, Mr. Sherron decided that a water curtain should be established in the area of the Conex trailer using water pumped from the impoundment below the Site through piping that ran parallel to the Conex trailer. He initially requested that HESI employees enter the well pad area to assist with these efforts. The HESI employees at the Site advised Mr. Sherron and Statoil representatives that they believed that the risk to HESI employees establishing the water curtain and the risk to the environment from runoff from the water curtain outweighed the risk of explosion and loss of materials in the Conex trailer, and as a result the HESI employees declined to participate in this effort. At one point during these discussions, Mr. Sherron indicated that he was less concerned about environmental impact resulting from the water curtain and instead his goal was to prevent another explosion. Mr. Sherron also stated that any person who interfered with establishing the water curtain would be escorted offsite by a sheriff. After the HESI employees refused to participate in establishing the water curtain in the area of the Conex trailer due to their deep concerns regarding employee safety and the potential environmental consequences of this strategy, the HESI representatives present at the Site were not consulted by Mr. Sherron, Statoil or others in the command center concerning establishing, maintaining or containing the water curtain.

Eventually employees from Rockwater, another Statoil contractor, provided pumps to move the water from the impoundment up through the onsite pipe that bordered the Conex trailer and cut the pipe in various locations with a chain saw, which resulted in a water curtain spray in the area of the Conex trailer. EPA representatives arriving at the Site at 2000 EDT on June 28, 2014, estimated that a minimum of 300,000 gallons of water was sprayed onto the Site and noted that the pumping of the water on the well pad resulted in uncontrolled runoff exiting the Site (a key risk that HESI representatives had identified in opposing the use of the water curtain spray) and entering an unnamed tributary of Opossum Creek.

- 43. Describe in detail the series of events that caused fluid that had been pumped into Well #7 to flow back up the well and onto the Site uncontained on and after June 28, 2014.**

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what EPA considers to be a "series of events" for purposes of this response. Furthermore, HESI objects to what appears to be EPA's position that HESI or any other person can determine a specific "cause" of fluid to flow back up Well #7H. Finally, the investigation into this incident is ongoing, and HESI reserves the right to supplement this response if additional facts become available concerning the release or threat of release of substances from the Site on June 28, 2014.

Subject to the foregoing, HESI responds that once the emergency alarm was sounded, all HESI employees immediately evacuated the well pad area to the muster point at the main entrance of the Site. Soon thereafter, these HESI employees were moved to locations further away from the Site. The three HESI employees who subsequently arrived at the well pad provided support as described in the response to Request No. 42, above. Accordingly, other than information that has been previously provided in response to other requests, HESI does not have information concerning the series of events that caused fluid that had been pumped into Well #7 to flow back up the well.

- 44. If there were any sensors in Well #7H on June 28, 2014, identify the sensors, their placement in the well, and provide any data received from those sensors during the hydraulic fracturing operations on Well #7H both prior to and after the incident on June 28, 2014.**

HESI is not aware of any sensors present in Well #7H on June 28, 2014.

- 45. Provide any sampling data or analysis that was performed on the hydraulic fracturing fluid that spilled out of Well #7H and onto the Site on and after 9:00 am EDT on June 28, 2014.**

HESI did not sample or analyze any of the hydraulic fracturing fluid that spilled out of Well #7H and does not possess any sampling data or analysis of such fluid.

- 46. Estimate the amount of fluid that had been pumped into Well#7H that flowed back up the well and onto the well pad on and after June 28, 2014. Submit all calculations and assumptions underlying the estimate.**

HESI objects to this request as unduly burdensome and outside the scope of EPA's information gathering authority under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds that it does not have information concerning the amount of fluid that flowed back up Well #7H and onto the well pad on and after June 28, 2014.

- 47. To the best of your knowledge, estimate the duration of the release or discharge of fluids from the Site. Explain how you determined the onset and mitigation of the release or discharge and what documents or information you relied on to make your determination.**

HESI objects to this request as unduly burdensome and outside the scope of EPA's information gathering authority under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds that it does not have information concerning the duration or discharge of fluids from the Site other than as described in the response to Request No. 42, above, which response is incorporated by reference.

- 48. Submit a detailed map depicting all of the areas impacted by the incident at the Site that began on June 28, 2014. Show the extent of all discharges and releases, location of recovery equipment, access routes and response staging areas, areas that were evacuated and roads that were closed (if applicable), and all other pertinent details. Include identified migration pathways from the Site to the unnamed tributary of Opossum Creek.**

HESI objects to this request as unduly burdensome and outside the scope of EPA's information gathering authority under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds that it does not have a map depicting all areas impacted by the incident at the Site that began on July 28, 2014. Furthermore, HESI does not have information that would enable HESI to create such a map.

- 49. Submit copies of calculations showing the amount of oil discharged, the amount recovered during the cleanup, the amount lost to evaporation, the amount degraded into the environment, and the amount that may still be present in the environment.**

As indicated in the response to Request No. 40, above, HESI has included with this response a spreadsheet which it prepared on or around July 2, 2014, that lists: (a) the estimated volume of HESI's materials at the Site at the time of the incident; and (b) the estimated volume of HESI's materials left at the Site on or about July 1, 2014. HESI has not performed any other calculations referenced in Request No. 49 and does not possess sufficient information to perform such calculations.

- 50. Describe the composition of any oil released on or after June 28, 2014 including any additives.**

See HESI's response to Request No. 40, above, which is incorporated herein by reference.

- 51. For each material, including pollutants or contaminants, hazardous substances, oil, petroleum, and petroleum products, that was released or discharged as a result of the incident at the Site that began on June 28, 2014, provide the following information. Describe your method or source of information and provide the calculations supporting the estimate provided.**

- a. The amount released or discharged to the environment from the Site;**
- b. The amount released or migrated onto and/or into the soil and/or the subsurface strata;**
- c. The amount discharged into a sanitary sewer system. If any, describe the pretreatment conducted by your facility;**
- d. The amount discharged into a storm sewer;**
- e. The amount discharged into the Site drainage system;**
- f. The amount discharged into the unnamed tributary of Opossum Creek located approximately one and a half miles from the Site;**
- g. The amount discharged or released to any other surface and a description of those surfaces;**
- h. The amount that volatilized;**
- i. The amount degraded into the environment; and**
- j. The amount remaining in the environment.**

HESI has not performed any calculations concerning the information referenced in Request No. 51 and does not possess sufficient information to perform such calculations.

- 52. For the purposes of this question, the term "pollutant" shall have the same definition as that contained in Section 504 of the Clean Water Act. For any pollutant that was released or discharged as a result of the incident at the Site that began on June 28, 2014, provide the following information. Describe your method or source of information and provide the calculations supporting the estimate provided. If the information has already been provided in response to Question #51, indicate the name of the pollutant and that the information was already provided.**

- a. The amount released or discharged to the environment from the Site;**

- b. The amount released or migrated onto and/or into the soil and/or the subsurface strata;
- c. The amount discharged into a sanitary sewer system;
- d. The amount discharged into a storm sewer;
- e. The amount discharged into the Site drainage system;
- f. The amount discharged into the unnamed tributary of Opossum Creek located approximately one and a half miles from the Site;
- g. The amount discharged or released to any other surface and a description of those surfaces;

HESI has not performed any calculations concerning the information referenced in Request No. 52 and does not possess sufficient information to perform such calculations.

53. Did any hazardous substance react with any substance to cause a by-product? If so, explain and provide the calculations to show the reaction and quantity of each by-product released.

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. Subject to the foregoing, HESI responds that it does not have information that indicates that any hazardous substance at the Site reacted with another substance to cause a by-product.

54. Submit copies of all reports and analytical results related to the monitoring or sampling of the areas impacted by the incident at the Site that began on June 28, 2014. Do not include reports and data already submitted in response to other response items in this Information Request.

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what is meant by "areas impacted by the incident at the Site." Subject to the foregoing, HESI responds that all reports and analytical results related to soil, water (ground and surface) or air quality in HESI's possession, custody or control associated with the Site are included in the response to Request No. 12, above, which is incorporated herein by reference.

55. Submit copies of all photographs and video related to the fire and subsequent response efforts on and after June 28, 2014 at the Site.

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what is meant by "subsequent response efforts." Subject to the foregoing, included in this response are two

videos taken by one of HESI's employees, Clay Thompson, on June 28, 2014, from two locations outside the well pad area. In addition, HESI possesses over 700 photos of HESI equipment taken on or about July 1, 2014, after the fire had been extinguished. Please inform HESI whether EPA wishes for HESI to provide copies of these photos to EPA.

- 56. Describe in detail the actions taken by your employees and/or anyone else regarding the emergency response to the fire and release, including any and all chemicals used, the handling or clean-up of the materials, oil, hazardous substances, and hazardous chemicals released, including transportation and disposal.**

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what is meant by "regarding the emergency response to the fire and release." For purposes of this response, HESI assumes that the "emergency response" includes the time period from when the fire incident started to when the fire was extinguished on June 29, 2014.

Additionally, the request to describe the actions "of anyone else" is overbroad and excessive on its face. Between HESI employees (both on site and in other locations), Statoil employees, other contractors hired by Statoil, and any first responders to the incident, there are likely *hundreds* of people who took some sort of action as part of the emergency response to the incident. Describing the actions of each of those people "in detail," to the extent HESI even has knowledge of those actions, is completely unreasonable and unlikely to provide additional relevant information. Subject to the foregoing, HESI responds as follows:

Once the emergency alarm was sounded on June 28, 2014, all HESI employees immediately evacuated the well pad area to the muster point at the main entrance of the Site. Soon thereafter, these HESI employees were moved to locations further away from the Site. The three HESI employees who subsequently arrived at the Site provided support as described in HESI's response to Request No. 42, above, which is incorporated herein by reference.

- 57. Provide copies of any RCRA hazardous waste manifests for hazardous wastes removed from the Site after June 28, 2014.**

HESI does not possess any RCRA hazardous waste manifests for hazardous wastes removed from the Site after June 28, 2014.

- 58. Identify the party that established the water curtain used to protect a trailer containing compressed gas cylinders and the source of the water utilized to establish the water curtain. If the water was not fresh water, describe its composition.**

Please see HESI's response to Request No. 42, above, which is incorporated herein by reference. HESI has no information about the source or composition of the water utilized to establish the water curtain.

59. If any fluids and substances were released to a containment area, please respond to the following information requests:

- a. What is the containment area made of?**
- b. What are the dimensions of the containment area?**
- c. Did the containment area contain a neutralization agent? If so, what and how much of the neutralization agent was present?**

HESI does not have information about whether fluids and substances were released to a containment area at the Site or any information about the size and construction of any containment area that may have received a release of fluids and substances at the Site.

60. What secondary containment, if any, was in place at the Site on June 28, 2014? If that secondary containment failed to work properly, then identify why the secondary containment failed to work properly.

HESI objects to this request as vague, overly broad, unduly burdensome and not reasonably related to EPA's lawful objectives under Section 104(e) of CERCLA or Section 308 and 311 of the CWA. In particular, it is unclear what is meant by "work properly." Subject to the foregoing, as a contractor hired by Statoil to perform hydraulic fracturing services at the Site under the direction and supervision of Statoil, HESI was not responsible for establishing, maintaining or observing the operation of secondary containment. HESI believes that some earthen berms were located in portions of the well pad boundary. In addition, Statoil supplied rig matting throughout the well pad area. HESI does not have sufficient information to respond whether or not the secondary containment described above worked properly.

61. Are you or your consultants planning to perform any investigations of the soil, water (ground or surface), geology, hydrology or air quality on or about the Site?

No.

If so, identify:

- a. What the nature and scope of these investigations will be;**
- b. The contractors or other persons that will undertake these investigations;**
- c. The purpose of the investigations;**
- d. The dates when such investigations will take place and be completed; and**
- e. Where on the Site such investigation will take place.**

62. **Provide copies of all investigative documents prepared by you, your agents, or your contractors with respect to the incidents of June 28, 2014 through now at the Site. If these have already been provided in response to another Information Request, indicate the question number.**

Please see HESI's response to Request No. 41, which is incorporated herein by reference.

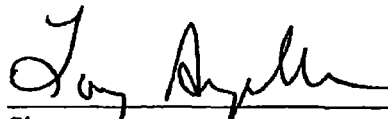
63. **Submit copies of all correspondence with the Ohio Department of Natural Resources (ODNR), Ohio Environmental Protection Agency (OEPA), local officials, your insurers, and the United States Fish and Wildlife Service that involve the incident at the Site, the response at the Site, and any other incident-related event from June 28, 2014 through the present.**

In response to this request, HESI has included copies of correspondence with ODNR, OEPA, local officials (*i.e.*, officials representing agencies located in Clarington, OH or Monroe County, OH), HESI's insurers and the United States Fish and Wildlife Service that relate to the incident or the incident response. HESI has also included correspondence with the Ohio River Valley Water Sanitation Commission (ORSANCO), the Kentucky Department of Environmental Protection and certain area water authorities. **Please note that HESI considers some of the materials being provided in response to this request to constitute confidential business information or trade secrets.** In accordance with Enclosure A of the Information Request, these materials are identified with a "CBI" prefix and are being provided in a separate binder. HESI notes that the documents submitted in response to this request include correspondence with OEPA that resulted in OEPA determining that the confidential business information associated with hydraulic fracturing additives is entitled to protection from disclosure by OEPA as a trade secret. HESI believes this supporting correspondence with OEPA similarly establishes that the information designated as confidential in the response to this request is entitled to protection from disclosure by EPA as confidential business information.

DECLARATION

I declare under penalty of perjury that I am authorized to sign this Response on behalf of Respondent and that the foregoing responses, to the best of my knowledge and belief, are complete, true, and correct.

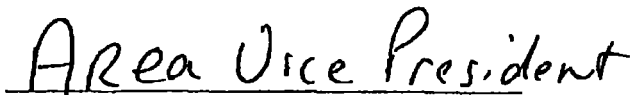
Executed on October 13, 2014.



Signature



Type or Print Name



Title

LAW OFFICES

MANKO, GOLD, KATCHER & FOX, LLP

SUITE 500 401 CITY AVENUE
BALA CYNWYD, PA 19004

FIRST CLASS MAIL

MANKO | GOLD | KATCHER | FOX LLP

401 CITY AVENUE, SUITE 901
BALA CYNWYD, PA 19004

TO:

Arlene Lilly, Enforcement Specialist
U.S. Environmental Protection Agency, Region 5
Superfund Division - Enforcement & Compliance
Assurance Branch
Enforcement Services Section 1, SE-5J
77 West Jackson Boulevard
Chicago, IL 60604-3590

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**RESPONSE OF HALLIBURTON ENVIRONMENTAL
SERVICES, INC. (“HESI”)
TO UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY INFORMATION REQUEST
PURSUANT TO SECTION 104(E) OF CERCLA
AND SECTIONS 308 AND 311 OF CWA**

BINDER 1 of 2

**Index to Response of Halliburton Environmental Services, Inc. ("HESI")
to United States Environmental Protection Agency Request
Pursuant to Section 104(e) of CERCLA and Sections 308 and 311 of CWA**

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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K

(Mark One)

☒ Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934
For the fiscal year ended December 31, 2013

OR

☐ Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934
For the transition period from _____ to _____

Commission File Number 001-03492

HALLIBURTON COMPANY

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

75-2677995
(I R S Employer
Identification No.)

3000 North Sam Houston Parkway East
Houston, Texas 77032

(Address of principal executive offices)

Telephone Number – Area code (281) 871-2699

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Common Stock par value \$2.50 per share	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act:

Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act:

Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) and (2) has been subject to such filing requirements for the past 90 days:

Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files):

Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K: ☒

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer: ☒ Accelerated filer: ☐
Non-accelerated filer: ☐ Smaller reporting company: ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act): Yes ☐ No ☒

The aggregate market value of Halliburton Company Common Stock held by nonaffiliates on June 30, 2013, determined using the per share closing price on the New York Stock Exchange Composite tape of \$41.72 on that date, was approximately \$38,003,000,000.

As of January 31, 2014, there were 850,866,860 shares of Halliburton Company Common Stock, \$2.50 par value per share, outstanding.

Portions of the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No. 001-03492) are incorporated by reference into Part III of this report.

HESI00001

HALLIBURTON COMPANY
Index to Form 10-K
For the Year Ended December 31, 2013

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PART I

Item 1. Business.

General description of business

Halliburton Company's predecessor was established in 1919 and incorporated under the laws of the State of Delaware in 1924. We are a leading provider of services and products to the energy industry related to the exploration, development, and production of oil and natural gas. We serve major, national, and independent oil and natural gas companies throughout the world and operate under two divisions, which form the basis for the two operating segments we report, the Completion and Production segment and the Drilling and Evaluation segment.

- our Completion and Production segment delivers cementing, stimulation, intervention, pressure control, specialty chemicals, artificial lift, and completion services. The segment consists of Production Enhancement, Cementing, Completion Tools, Halliburton Boots & Cools, Multi-Chem, and Halliburton Artificial Lift.
- our Drilling and Evaluation segment provides field and reservoir modeling, drilling, evaluation, and precise wellbore placement solutions that enable customers to model, measure, drill, and optimize their well construction activities. The segment consists of Baroid, Sperry Drilling, Wireline and Perforating, Drill Bits and Services, Landmark Software and Services, Testing and Subsea, and Consulting and Project Management.

See Note 2 to the consolidated financial statements for further financial information related to each of our business segments and a description of the services and products provided by each segment. We have significant manufacturing operations in various locations, including the United States, Canada, Malaysia, Singapore, and the United Kingdom.

Business strategy

Our business strategy is to secure a distinct and sustainable competitive position as an oilfield service company by delivering services and products that enable our customers to extract proven reserves and maximize recovery. Our objectives are to

- create a balanced portfolio of services and products supported by global infrastructure and anchored by technological innovation to further differentiate our company,
- reach a distinguished level of operational excellence that reduces costs and creates real value,
- preserve a dynamic workforce by being a preferred employer to attract, develop, and retain the best global talent, and
- uphold our strong ethical and business standards, and maintain the highest standards of health, safety, and environmental performance.

Markets and competition

We are one of the world's largest diversified energy services companies. Our services and products are sold in highly competitive markets throughout the world. Competitive factors impacting sales of our services and products include

- price,
- service delivery (including the ability to deliver services and products on an "as needed, where needed" basis),
- health, safety, and environmental standards and practices,
- service quality,
- global talent retention,
- understanding the geological characteristics of the hydrocarbon reservoir,
- product quality,
- warranty, and
- technical proficiency.

We conduct business worldwide in approximately 80 countries. The business operations of our divisions are organized around four primary geographic regions: North America, Latin America, Europe/Africa/CIS, and Middle East/Asia. In 2013, 2012, and 2011, based on the location of services provided and products sold, 49%, 53%, and 55% of our consolidated revenue was from the United States. No other country accounted for more than 10% of our consolidated revenue during these periods. See "Management's Discussion and Analysis of Financial Condition and Results of Operations – Business Environment and Results of Operations" and Note 2 to the consolidated financial statements for additional financial information about our geographic operations in the last three years. Because the markets for our services and products are vast and cross numerous geographic lines, it is not practicable to provide a meaningful estimate of the total number of our competitors. The industries we serve are highly competitive, and we have many substantial competitors. Most of our services and products are marketed through our servicing and sales organizations.

Operations in some countries may be adversely affected by unsettled political conditions, acts of terrorism, civil unrest, expropriation or other governmental actions, foreign currency exchange restrictions, and highly inflationary currencies, as well as other geopolitical factors. We believe the geographic diversification of our business activities reduces the risk that loss of operations in any one country, other than the United States, would significantly impact the conduct of our operations taken as a whole.

Information regarding our exposure to foreign currency fluctuations, risk concentration, and financial instruments used to minimize risk is included in "Management's Discussion and Analysis of Financial Condition and Results of Operations – Financial Instrument Market Risk" and in Note 13 to the consolidated financial statements.

Customers

Our revenue from continuing operations during the past three years was derived from the sale of services and products to the energy industry. No customer represented more than 10% of our consolidated revenue in any period presented.

Raw materials

Raw materials essential to our business are normally readily available. Market conditions can trigger constraints in the supply of certain raw materials, such as proppants, hydrochloric acid, and gels, including guar gum (a blending additive used in our hydraulic fracturing process). We are always seeking ways to ensure the availability of resources, as well as manage costs of raw materials. Our procurement department uses our size and buying power to enhance our access to key materials at competitive prices.

Research and development costs

We maintain an active research and development program. The program improves products, processes, and engineering standards and practices that serve the changing needs of our customers, such as those related to high pressure and high temperature environments, and also develops new products and processes. Our expenditures for research and development activities were \$588 million in 2013, \$460 million in 2012, and \$401 million in 2011. We sponsored over 95% of these expenditures in each year.

Patents

We own a large number of patents and have pending a substantial number of patent applications covering various products and processes. We are also licensed to utilize patents owned by others. We do not consider any particular patent to be material to our business operations.

Seasonality

Weather and natural phenomena can temporarily affect the performance of our services, but the widespread geographical locations of our operations mitigate those effects. Examples of how weather can impact our business include:

- the severity and duration of the winter in North America can have a significant impact on natural gas storage levels and drilling activity,
- the timing and duration of the spring thaw in Canada directly affects activity levels due to road restrictions,
- typhoons and hurricanes can disrupt coastal and offshore operations, and
- severe weather during the winter months normally results in reduced activity levels in the North Sea and Russia.

Additionally, customer spending patterns for software and various other oilfield services and products can result in higher activity in the fourth quarter of the year.

Employees

At December 31, 2013, we employed approximately 77,000 people worldwide compared to approximately 73,000 at December 31, 2012. At December 31, 2013, approximately 15% of our employees were subject to collective bargaining agreements. Based upon the geographic diversification of these employees, we do not believe any risk of loss from employee strikes or other collective actions would be material to the conduct of our operations taken as a whole.

Environmental regulation

We are subject to numerous environmental, legal, and regulatory requirements related to our operations worldwide. For further information related to environmental matters and regulation, see Note 8 to the consolidated financial statements and Item 1(a), "Risk Factors."

Hydraulic fracturing process

Hydraulic fracturing is a process that creates fractures extending from the well bore through the rock formation to enable natural gas or oil to move more easily through the rock pores to a production well. A significant portion of our Completion and Production segment provides hydraulic fracturing services to customers developing shale natural gas and shale oil. From time to time, questions arise about the scope of our operations in the shale natural gas and shale oil sectors, and the extent to which these operations may affect human health and the environment.

We generally design and implement a hydraulic fracturing operation to "stimulate" the well, at the direction of our customer, once the well has been drilled, cased, and cemented. Our customer is generally responsible for providing the base fluid (usually water) used in the hydraulic fracturing of a well. We supply the proppant (often sand) and any additives used in the overall fracturing fluid mixture. In addition, we mix the additives and proppant with the base fluid and pump the mixture down the wellbore to create the desired fractures in the target formation. The customer is responsible for disposing of any materials that are subsequently pumped out of the well, including flowback fluids and produced water.

As part of the process of constructing the well, the customer will take a number of steps designed to protect drinking water resources. In particular, the casing and cementing of the well are designed to provide "zonal isolation" so that the fluids pumped down the wellbore and the oil and natural gas and other materials that are subsequently pumped out of the well will not come into contact with shallow aquifers or other shallow formations through which those materials could potentially migrate to the surface.

The potential environmental impacts of hydraulic fracturing have been studied by numerous government entities and others. In 2004, the United States Environmental Protection Agency (EPA) conducted an extensive study of hydraulic fracturing practices, focusing on coalbed methane wells, and their potential effect on underground sources of drinking water. The EPA's study concluded that hydraulic fracturing of coalbed methane wells poses little or no threat to underground sources of drinking water. At the request of Congress, the EPA is currently undertaking another study of the relationship between hydraulic fracturing and drinking water resources that will focus on the fracturing of shale natural gas wells.

We have made detailed information regarding our fracturing fluid composition and breakdown available on our internet web site at www.halliburton.com. We also have proactively developed processes to provide our customers with the chemical constituents of our hydraulic fracturing fluids to enable our customers to comply with state laws as well as voluntary standards established by the Chemical Disclosure Registry, www.fracfocus.org.

At the same time, we have invested considerable resources in developing our CleanSuite™ hydraulic fracturing technologies, which offer our customers a variety of environment-friendly alternatives related to the use of hydraulic fracturing fluid additives and other aspects of our hydraulic fracturing operations. We created a hydraulic fracturing fluid system comprised of materials sourced entirely from the food industry. In addition, we have engineered a process to control the growth of bacteria in hydraulic fracturing fluids that uses ultraviolet light, allowing customers to minimize the use of chemical biocides. We are committed to the continued development of innovative chemical and mechanical technologies that allow for more economical and environmentally friendly development of the world's oil and natural gas reserves.

In evaluating any environmental risks that may be associated with our hydraulic fracturing services, it is helpful to understand the role that we play in the development of shale natural gas and shale oil. Our principal task generally is to manage the process of injecting fracturing fluids into the borehole to "stimulate" the well. Thus, based on the provisions in our contracts and applicable law, the primary environmental risks we face are potential pre-injection spills or releases of stored fracturing fluids and potential spills or releases of fuel or other fluids associated with pumps, blenders, conveyors, or other above-ground equipment used in the hydraulic fracturing process.

Although possible concerns have been raised about hydraulic fracturing operations, the circumstances described above have helped to mitigate those concerns. To date, we have not been obligated to compensate any indemnified party for any environmental liability arising directly from hydraulic fracturing, although there can be no assurance that such obligations or liabilities will not arise in the future.

Working capital

We fund our business operations through a combination of available cash and equivalents, short-term investments, and cash flow generated from operations. In addition, our revolving credit facility is available for additional working capital needs.

Web site access

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act of 1934 are made available free of charge on our internet web site at www.halliburton.com as soon as reasonably practicable after we have electronically filed the material with, or furnished it to, the Securities and Exchange Commission (SEC). The public may read and copy any materials we have filed with the SEC at the SEC's Public Reference Room at 100 F Street, NE, Washington, DC 20549. Information on the operation of the Public Reference Room may be obtained by calling the SEC at 1-800-SEC-0330. The SEC maintains an internet site that contains our reports, proxy and information statements, and our other SEC filings. The address of that web site is www.sec.gov. We have posted on our web site our Code of Business Conduct, which applies to all of our employees and Directors and serves as a code of ethics for our principal executive officer, principal financial officer, principal accounting officer, and other persons performing similar functions. Any amendments to our Code of Business Conduct or any waivers from provisions of our Code of Business Conduct granted to the specified officers above are disclosed on our web site within four business days after the date of any amendment or waiver pertaining to these officers. There have been no waivers from provisions of our Code of Business Conduct for the years 2013, 2012, or 2011. Except to the extent expressly stated otherwise, information contained on or accessible from our web site or any other web site is not incorporated by reference into this annual report on Form 10-K and should not be considered part of this report.

Executive Officers of the Registrant

The following table indicates the names and ages of the executive officers of Halliburton Company as of February 7, 2014, including all offices and positions held by each in the past five years:

<u>Name and Age</u>	<u>Offices Held and Term of Office</u>
James S. Brown (Age 59)	President, Western Hemisphere of Halliburton Company, since January 2008

Name and Age

Christian A. Garcia
(Age 50)

Offices Held and Term of Office

Senior Vice President and Chief Accounting Officer of Halliburton Company, since January 2014

Senior Vice President and Treasurer of Halliburton Company, September 2011 to December 2013

Senior Vice President, Investor Relations of Halliburton Company, January 2011 to August 2011

Vice President, Investor Relations of Halliburton Company, December 2007 to December 2010

Myrtle L. Jones
(Age 54)

Senior Vice President, Tax of Halliburton Company, since March 2013

Senior Managing Director of Tax and Internal Audit, Service Corporation International, February 2008 to February 2013

* David J. Lesar
(Age 60)

Chairman of the Board, President, and Chief Executive Officer of Halliburton Company, since August 2000

* Mark A. McCollum
(Age 54)

Executive Vice President and Chief Financial Officer of Halliburton Company, since January 2008

Timothy M. McKeon
(Age 41)

Vice President and Treasurer of Halliburton Company, since January 2014

Assistant Treasurer of Halliburton Company, September 2011 to December 2013

Director of Finance, Drilling & Evaluation Division of Halliburton Company, February 2011 to August 2011

Director of Treasury Operations of Halliburton Company, March 2009 to January 2011

Senior Manager, Corporate Finance of Halliburton Company, August 2006 to February 2009

* Jeffrey A. Miller
(Age 50)

Executive Vice President and Chief Operating Officer of Halliburton Company, since September 2012

Senior Vice President, Global Business Development and Marketing of Halliburton Company, January 2011 to August 2012

Senior Vice President, Gulf of Mexico Region of Halliburton Company, January 2010 to December 2010

Vice President, Baroid, May 2006 to December 2009

* Lawrence J. Pope
(Age 45)

Executive Vice President of Administration and Chief Human Resources Officer of Halliburton Company, since January 2008

Joe D. Rainey
(Age 57)

President, Eastern Hemisphere of Halliburton Company, since January 2011

Senior Vice President, Eastern Hemisphere of Halliburton Company, January 2010 to December 2010

Vice President, Eurasia Pacific Region of Halliburton Company, January 2009 to December 2009

* Robb L. Voyles (Age 56)

Executive Vice President and General Counsel of Halliburton Company, since January 2014

Senior Vice President, Law of Halliburton Company, September 2013 to December 2013

Partner, Baker Botts L.L.P., January 1989 to August 2013

* Members of the Policy Committee of the registrant

There are no family relationships between the executive officers of the registrant or between any director and any executive officer of the registrant

Item 1(a). Risk Factors.

The statements in this section describe the known material risks to our business and should be considered carefully.

We, among others, have been named as a defendant in numerous lawsuits and there have been numerous investigations relating to the Macondo well incident that could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

The semisubmersible drilling rig, Deepwater Horizon, sank on April 22, 2010 after an explosion and fire onboard the rig that began on April 20, 2010. The Deepwater Horizon was owned by Transocean Ltd. and had been drilling the Macondo exploration well in Mississippi Canyon Block 252 in the Gulf of Mexico for the lease operator, BP Exploration (BP Exploration), an indirect wholly owned subsidiary of BP plc (BP plc, BP Exploration, and their affiliates, collectively, BP). There were eleven fatalities and a number of injuries as a result of the Macondo well incident. Crude oil escaping from the Macondo well site spread across thousands of square miles of the Gulf of Mexico and reached the United States Gulf Coast. We performed a variety of services for BP Exploration, including cementing, mud logging, directional drilling, measurement-while-drilling, and rig data acquisition services.

We are named along with other unaffiliated defendants in more than 1,800 complaints, most of which are alleged class-actions, involving pollution damage claims and at least eight personal injury lawsuits involving four decedents and at least 10 allegedly injured persons who were on the drilling rig at the time of the incident. At least six additional lawsuits naming us and others relate to alleged personal injuries sustained by those responding to the explosion and oil spill. Other defendants in the lawsuits have filed claims against us seeking subrogation, indemnification, including with respect to liabilities under the Oil Pollution Act of 1990 (OPA), contribution and direct damages, and alleging negligence, gross negligence, fraudulent conduct, willful misconduct, and fraudulent concealment. See Note 8 to the consolidated financial statements. Additional lawsuits may be filed against us, including civil actions under federal statutes and regulations, as well as criminal and civil actions under state statutes and regulations. Those statutes and regulations could result in criminal penalties, including fines and imprisonment, as well as civil fines, and the degree of the penalties and fines may depend on the type of conduct and level of culpability, including strict liability, negligence, gross negligence, and knowing violations of the statute or regulation.

In addition to the claims and lawsuits described above, several regulatory agencies and others have investigated or are investigating the cause of the explosion, fire, and resulting oil spill. Reports issued as a result of those investigations have been critical of BP, Transocean, and us, among others. For example, one or more of those reports have concluded that primary cement failure was a direct cause of the blowout, cement testing performed by an independent laboratory "strongly suggests" that the foam cement slurry used on the Macondo well was unstable, and that numerous other oversights and factors caused or contributed to the cause of the incident, including BP's failure to run a cement bond log, BP's and Transocean's failure to properly conduct and interpret a negative-pressure test, the failure of the drilling crew and our surface data logging specialist to recognize that an unplanned influx of oil, natural gas, or fluid into the well was occurring, communication failures among BP, Transocean, and us, and flawed decisions relating to the design, construction, and testing of barriers critical to the temporary abandonment of the well.

In October 2011, the Bureau of Safety and Environmental Enforcement (BSEE) issued a notification of Incidents of Noncompliance (INCs) to us for allegedly violating federal regulations relating to the failure to take measures to prevent the unauthorized release of hydrocarbons, the failure to take precautions to keep the Macondo well under control, the failure to cement the well in a manner that would, among other things, prevent the release of fluids into the Gulf of Mexico, and the failure to protect health, safety, property, and the environment as a result of a failure to perform operations in a safe and workmanlike manner. According to the BSEE's notice, we did not ensure an adequate barrier to hydrocarbon flow after cementing the production casing and did not detect the influx of hydrocarbons until they were above the blowout preventer stack. We understand that the regulations in effect at the time of the alleged violations provide for fines of up to \$35,000 per day per violation. We have appealed the INCs to the Interior Board of Land Appeals (IBLA). In January 2012, the IBLA, in response to our and the BSEE's joint request, suspended the appeal pending certain proceedings in the multi-district litigation (MDL) trial. Once the MDL court issues a final decision in the trial, we expect to file a proposal for further action in the appeal. The BSEE has announced that the INCs will be reviewed for possible imposition of civil penalties once the appeal has ended. The BSEE has stated that this is the first time the Department of the Interior has issued INCs directly to a contractor that was not the well's operator.

Our contract with BP Exploration relating to the Macondo well generally provides for our indemnification by BP Exploration for certain potential claims and expenses relating to the Macondo well incident. BP Exploration, in connection with filing its claims with respect to the MDL proceeding, asked the court to declare that it is not liable to us in contribution, indemnification, or otherwise with respect to liabilities arising from the Macondo well incident. Other defendants in the litigation have generally denied any obligation to contribute to any liabilities arising from the Macondo well incident. In January 2012, the court in the MDL proceeding entered an order in response to our and BP's motions for summary judgment regarding certain indemnification matters. The court held that BP is required to indemnify us for third-party compensatory claims, or actual damages, that arise from pollution or contamination that did not originate from our property or equipment located above the surface of the land or water, even if we are found to be grossly negligent. The court also held that BP does not owe us indemnity for punitive damages or for civil penalties under the Clean Water Act (CWA), if any, and that fraud could void the indemnity on public policy grounds. The court in the MDL proceeding deferred ruling on whether our indemnification from BP covers penalties or fines under the Outer Continental Shelf Lands Act, whether our alleged breach of our contract with BP Exploration would invalidate the indemnity, and whether we committed an act that materially increased the risk to or prejudiced the rights of BP so as to invalidate the indemnity.

The rulings in the MDL proceeding regarding the indemnities are based on maritime law and may not bind the determination of similar issues in lawsuits not comprising a part of the MDL proceeding. Accordingly, it is possible that different conclusions with respect to indemnities will be reached by other courts.

Indemnification for criminal fines or penalties, if any, may not be available if a court were to find such indemnification unenforceable as against public policy. In addition, certain state laws, if deemed to apply, would not allow for enforcement of indemnification for gross negligence, and may not allow for enforcement of indemnification of persons who are found to be negligent with respect to personal injury claims. We may not be insured with respect to civil or criminal fines or penalties, if any, pursuant to the terms of our insurance policies.

BP's public filings indicate that BP has recognized in excess of \$40 billion in pre-tax charges, excluding offsets for settlement payments received from certain defendants in the MDL, as a result of the Macondo well incident. BP's public filings also indicate that the amount of, among other things, certain natural resource damages with respect to certain OPA claims, some of which may be included in such charges, cannot be reliably estimated as of the dates of those filings.

We are currently unable to fully estimate the impact the Macondo well incident will have on us. We cannot predict the outcome of the many lawsuits and investigations relating to the Macondo well incident, including orders and rulings of the court that impact the MDL, the results of the MDL trial, the effect that the settlements between BP and the Plaintiffs' Steering Committee (PSC) in the MDL and other settlements may have on claims against us, or whether we might settle with one or more of the parties to any lawsuit or investigation. The first two phases of the MDL trial have concluded, and the MDL court could begin issuing rulings at any time. A determination that the performance of our services on the Deepwater Horizon constituted gross negligence could result in substantial liability to the numerous plaintiffs for punitive damages and potentially to BP with respect to its direct claims against us.

As of December 31, 2013, our loss contingency reserve for the Macondo well incident, relating to the MDL, remained at \$1.3 billion, which represents a loss contingency that is probable and for which a reasonable estimate of loss can be made. We have participated in intermittent discussions with the PSC regarding the potential for a settlement that would resolve a substantial portion of the claims pending in the MDL trial. BP, however, has not participated in any recent settlement discussions with us.

Reaching a settlement involves a complex process, and there can be no assurance as to whether or when we may complete a settlement. In addition, the settlement discussions we have had to date do not cover all parties and claims relating to the Macondo well incident. Accordingly, there are additional loss contingencies relating to the Macondo well incident that are reasonably possible but for which we cannot make a reasonable estimate. Given the numerous potential developments relating to the MDL and other lawsuits and investigations, which could occur at any time, we may adjust our estimated loss contingency reserve in the future. Liabilities arising out of the Macondo well incident could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Certain matters relating to the Macondo well incident, including increased regulation of the United States offshore drilling industry, and similar catastrophic events could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

The Macondo well incident and the subsequent oil spill resulted in offshore drilling delays, temporary drilling bans, and increased federal regulation of our and our customers' operations, and more regulations and delays are possible. For example, the BSEE has issued regulations that provide revised casing and cementing requirements, including integrity testing standards, that mandate independent third-party verification that impose blowout preventer capability, testing, and documentation obligations, and that outline standards for specific well control training for deeperwater operations, among other requirements.

- issued revised regulations in 2013 to require, among other things, increased employee involvement in certain safety measures and third-party audits of operators' safety and environmental management systems.
- proposed stricter requirements for subsea drilling production equipment.
- stated that it intends to propose new standards for the design and maintenance of blowout preventers, and
- stated that it, together with the Bureau of Ocean Energy Management, is drafting new standards governing drilling in the Arctic.

In addition, the BSEE contends that it has the legal authority to extend its regulatory reach to include contractors, like us, in addition to operators as evidenced by the INCs.

The increased regulation of the exploration and production industry as a whole that arises out of the Macondo well incident has and could continue to result in higher operating costs for us and our customers, extended permitting and drilling delays, and reduced demand for our services. We cannot predict to what extent increased regulation may be adopted in international or other jurisdictions where they may not be required.

In addition, the Macondo well incident negatively impacted and could continue to negatively impact the availability and cost of insurance coverage for us, our customers, and our and their service providers. Also, our relationships with BP and others involved in the Macondo well incident could be negatively affected. Our business may be adversely impacted by any negative publicity relating to the incident, any negative perceptions about us by our customers, any increases in insurance premiums or difficulty in obtaining coverage, and the diversion of management's attention from our operations to focus on matters relating to the incident.

As illustrated by the Macondo well incident, the services we provide for our customers are performed in challenging environments that can be dangerous. Catastrophic events such as a well blowout, fire, or explosion can occur, resulting in property damage, personal injury, death, pollution, and environmental damage. While we have agreements with certain customers that require them to indemnify us for these types of events and the resulting damages and injuries (except in some cases, claims by our employees, loss or damages to our property, and any pollution emanating directly from our equipment), we will be exposed to significant potential losses should such liability provisions be determined by a court to be unenforceable or otherwise invalid, in whole or in part, or if our customers are unable or unwilling to satisfy any indemnifying obligations.

The matters discussed above relating to the Macondo well incident and similar catastrophic events could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Our operations are subject to political and economic instability, risk of government actions, and cyber attacks that could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

We are exposed to risks inherent in doing business in each of the countries in which we operate. Our operations are subject to various risks unique to each country that could have a material adverse effect on our business, consolidated results of operations and consolidated financial condition. With respect to any particular country, these risks may include:

- political and economic instability, including
 - civil unrest, acts of terrorism, force majeure, war or other armed conflict,
 - inflation, and
 - currency fluctuations, devaluations, and conversion restrictions, and
- governmental actions that may
 - result in expropriation and nationalization of our assets in that country,
 - result in confiscatory taxation or other adverse tax policies,
 - limit or disrupt markets, restrict payments, or limit the movement of funds,
 - result in the deprivation of contract rights, and
 - result in the inability to obtain or retain licenses required for operation

For example, due to the unsettled political conditions in many oil-producing countries, our operations, revenue, and profits are subject to the adverse consequences of war, the effects of terrorism, civil unrest, strikes, currency controls, and governmental actions. These and other risks described above could result in the loss of our personnel or assets, cause us to evacuate our personnel from certain countries, cause us to increase spending on security worldwide, disrupt financial and commercial markets including the supply of and pricing for oil and natural gas, and generate greater political and economic instability in some of the geographic areas in which we operate. Areas where we operate that have significant risk include, but are not limited to the Middle East, North Africa, Angola, Argentina, Azerbaijan, Colombia, Indonesia, Kazakhstan, Mexico, Nigeria, Russia, and Venezuela. In addition, any possible reprisals as a consequence of military or other action, such as acts of terrorism in the United States or elsewhere, could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Our operations are also subject to the risk of cyber attacks. If our systems for protecting against cybersecurity risks prove not to be sufficient, we could be adversely affected by, among other things, loss or damage of intellectual property, proprietary information, or customer data, having our business operations interrupted, and increased costs to prevent, respond to, or mitigate cybersecurity attacks. These risks could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Our operations outside the United States require us to comply with a number of United States and international regulations, violations of which could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Our operations outside the United States require us to comply with a number of United States and international regulations. For example, our operations in countries outside the United States are subject to the United States Foreign Corrupt Practices Act (FCPA) which prohibits United States companies and their agents and employees from providing anything of value to a foreign official for the purposes of influencing any act or decision of these individuals in their official capacity to help obtain or retain business, direct business to any person or corporate entity, or obtain any unfair advantage. Our activities create the risk of unauthorized payments or offers of payments by our employees, agents, or joint venture partners that could be in violation of the FCPA, even though these parties are not subject to our control. We have internal control policies and procedures and have implemented training and compliance programs for our employees and agents with respect to the FCPA. However, we cannot assure that our policies, procedures, and programs always will protect us from reckless or criminal acts committed by our employees or agents. Allegations of violations of applicable anti-corruption laws, including the FCPA, may result in internal, independent, or government investigations. Violations of the FCPA may result in severe criminal or civil sanctions, and we may be subject to other liabilities, which could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition. In addition, investigations by governmental authorities as well as legal, social, economic, and political issues in these countries could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition. We are also subject to the risks that our employees, joint venture partners, and agents outside of the United States may fail to comply with other applicable laws.

Changes in, compliance with, or our failure to comply with laws in the countries in which we conduct business may negatively impact our ability to provide services in, make sales of equipment to, and transfer personnel or equipment among some of those countries and could have a material adverse effect on our business and consolidated results of operations

In the countries in which we conduct business, we are subject to multiple and at times, inconsistent regulatory regimes, including those that govern our use of radioactive materials explosives, and chemicals in the course of our operations Various national and international regulatory regimes govern the shipment of these items Many countries, but not all, impose special controls upon the export and import of radioactive materials explosives, and chemicals Our ability to do business is subject to maintaining required licenses and complying with these multiple regulatory requirements applicable to these special products In addition, the various laws governing import and export of both products and technology apply to a wide range of services and products we offer In turn, this can affect our employment practices of hiring people of different nationalities because these laws may prohibit or limit access to some products or technology by employees of various nationalities Changes in, compliance with, or our failure to comply with these laws may negatively impact our ability to provide services in, make sales of equipment to, and transfer personnel or equipment among some of the countries in which we operate and could have a material adverse effect on our business and consolidated results of operations

The adoption of any future federal, state, or local laws or implementing regulations imposing reporting obligations on, or limiting or banning, the hydraulic fracturing process could make it more difficult to complete natural gas and oil wells and could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

We are a leading provider of hydraulic fracturing services Various federal legislative and regulatory initiatives have been undertaken which could result in additional requirements or restrictions being imposed on hydraulic fracturing operations For example, the Department of Interior has issued proposed regulations that would apply to hydraulic fracturing operations on wells that are subject to federal oil and gas leases and that would impose requirements regarding the disclosure of chemicals used in the hydraulic fracturing process as well as requirements to obtain certain federal approvals before proceeding with hydraulic fracturing at a well site These regulations, if adopted, would establish additional levels of regulation at the federal level that could lead to operational delays and increased operating costs At the same time, legislation and/or regulations have been adopted in several states that require additional disclosure regarding chemicals used in the hydraulic fracturing process but that generally include protections for proprietary information Legislation and/or regulations are being considered at the state and local level that could impose further chemical disclosure or other regulatory requirements (such as restrictions on the use of certain types of chemicals or prohibitions on hydraulic fracturing operations in certain areas) that could affect our operations In addition, governmental authorities in various foreign countries where we have provided or may provide hydraulic fracturing services have imposed or are considering imposing various restrictions or conditions that may affect hydraulic fracturing operations

The adoption of any future federal, state, local, or foreign laws or implementing regulations imposing reporting obligations on, or limiting or banning, the hydraulic fracturing process could make it more difficult to complete natural gas and oil wells and could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition

Liability for cleanup costs, natural resource damages, and other damages arising as a result of environmental laws could be substantial and could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

We are exposed to claims under environmental requirements and, from time to time, such claims have been made against us In the United States, environmental requirements and regulations typically impose strict liability Strict liability means that in some situations we could be exposed to liability for cleanup costs, natural resource damages, and other damages as a result of our conduct that was lawful at the time it occurred or the conduct of prior operators or other third parties Liability for damages arising as a result of environmental laws could be substantial and could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition

We are periodically notified of potential liabilities at federal and state superfund sites These potential liabilities may arise from both historical Halliburton operations and the historical operations of companies that we have acquired Our exposure at these sites may be materially impacted by unforeseen adverse developments both in the final remediation costs and with respect to the final allocation among the various parties involved at the sites The relevant regulatory agency may bring suit against us for amounts in excess of what we have accrued and what we believe is our proportionate share of remediation costs at any superfund site We also could be subject to third-party claims, including punitive damages, with respect to environmental matters for which we have been named as a potentially responsible party

Failure on our part to comply with, and the costs of compliance with, applicable health, safety, and environmental requirements could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Our business is subject to a variety of health, safety, and environmental laws, rules, and regulations in the United States and other countries, including those covering hazardous materials and requiring emission performance standards for facilities. For example, our well service operations routinely involve the handling of significant amounts of waste materials, some of which are classified as hazardous substances. We also store, transport, and use radioactive and explosive materials in certain of our operations. Applicable regulatory requirements include, for example, those concerning

- the containment and disposal of hazardous substances, oilfield waste, and other waste materials,
- the importation and use of radioactive materials,
- the use of underground storage tanks, and
- the use of underground injection wells

These and other requirements generally are becoming increasingly strict. Sanctions for failure to comply with the requirements, many of which may be applied retroactively, may include:

- administrative, civil, and criminal penalties,
- revocation of permits to conduct business, and
- corrective action orders including orders to investigate and/or clean up contamination

Failure on our part to comply with applicable environmental requirements could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition. We are also exposed to costs arising from regulatory compliance, including compliance with changes in or expansion of applicable regulatory requirements, which could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Existing or future laws, regulations, treaties or international agreements related to greenhouse gases and climate change could have a negative impact on our business and may result in additional compliance obligations with respect to the release, capture, and use of carbon dioxide that could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Changes in environmental requirements related to greenhouse gases and climate change may negatively impact demand for our services. For example, oil and natural gas exploration and production may decline as a result of environmental requirements, including land use policies responsive to environmental concerns. State, national, and international governments and agencies have been evaluating climate-related legislation and other regulatory initiatives that would restrict emissions of greenhouse gases in areas in which we conduct business. Because our business depends on the level of activity in the oil and natural gas industry, existing or future laws, regulations, treaties, or international agreements related to greenhouse gases and climate change, including incentives to conserve energy or use alternative energy sources, could have a negative impact on our business if such laws, regulations, treaties, or international agreements reduce demand for oil and natural gas. Likewise, such restrictions may result in additional compliance obligations with respect to the release, capture, sequestration, and use of carbon dioxide that could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Trends in oil and natural gas prices affect the level of exploration, development, and production activity of our customers and the demand for our services and products, which could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Demand for our services and products is particularly sensitive to the level of exploration, development, and production activity of, and the corresponding capital spending by, oil and natural gas companies, including national oil companies. The level of exploration, development, and production activity is directly affected by trends in oil and natural gas prices, which historically have been volatile and are likely to continue to be volatile.

Prices for oil and natural gas are subject to large fluctuations in response to relatively minor changes in the supply of and demand for oil and natural gas, market uncertainty, and a variety of other economic factors that are beyond our control. Any prolonged reduction in oil and natural gas prices will depress the immediate levels of exploration, development, and production activity which could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition. Even the perception of longer-term lower oil and natural gas prices by oil and natural gas companies can similarly reduce or defer major expenditures given the long-term nature of many large-scale development projects. Factors affecting the prices of oil and natural gas include:

- the level of supply and demand for oil and natural gas, especially demand for natural gas in the United States.
- governmental regulations, including the policies of governments regarding the exploration for and production and development of their oil and natural gas reserves.
- weather conditions and natural disasters,
- worldwide political, military, and economic conditions,
- the level of oil production by non-OPEC countries and the available excess production capacity within OPEC,
- oil refining capacity and shifts in end-customer preferences toward fuel efficiency and the use of natural gas,
- the cost of producing and delivering oil and natural gas, and
- potential acceleration of the development of alternative fuels.

Our business is dependent on capital spending by our customers, and reductions in capital spending could have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition.

Our business is directly affected by changes in capital expenditures by our customers, and reductions in their capital spending could reduce demand for our services and products and have a material adverse effect on our business, consolidated results of operations, and consolidated financial condition. Some of the items that may impact our customer's capital spending include:

- oil and natural gas prices, including volatility of oil and natural gas prices and expectations regarding future prices,
- the inability of our customers to access capital on economically advantageous terms.
- the consolidation of our customers,
- customer personnel changes, and
- adverse developments in the business or operations of our customers, including write-downs of reserves and borrowing base reductions under customer credit facilities.

Our business could be materially and adversely affected by severe or unseasonable weather where we have operations.

Our business could be materially and adversely affected by severe weather, particularly in the Gulf of Mexico, Russia, and the North Sea. Some experts believe global climate change could increase the frequency and severity of extreme weather conditions. Repercussions of severe or unseasonable weather conditions may include:

- evacuation of personnel and curtailment of services.
- weather-related damage to offshore drilling rigs resulting in suspension of operations.
- weather-related damage to our facilities and project work sites.
- inability to deliver materials to jobsites in accordance with contract schedules.
- decreases in demand for natural gas during unseasonably warm winters, and
- loss of productivity.

Changes in or interpretation of tax law and currency/repatriation control could impact the determination of our income tax liabilities for a tax year.

We have operations in approximately 80 countries. Consequently, we are subject to the jurisdiction of a significant number of taxing authorities. The income earned in these various jurisdictions is taxed on differing bases, including net income actually earned, net income deemed earned, and revenue-based tax withholding. The final determination of our income tax liabilities involves the interpretation of local tax laws, tax treaties, and related authorities in each jurisdiction, as well as the significant use of estimates and assumptions regarding the scope of future operations and results achieved and the timing and nature of income earned and expenditures incurred. Changes in the operating environment, including changes in or interpretation of tax law and currency/repatriation controls, could impact the determination of our income tax liabilities for a tax year.

We are subject to foreign exchange risks and limitations on our ability to reinvest earnings from operations in one country to fund the capital needs of our operations in other countries or to repatriate assets from some countries.

A sizable portion of our consolidated revenue and consolidated operating expenses is in foreign currencies. As a result, we are subject to significant risks, including

- foreign currency exchange risks resulting from changes in foreign currency exchange rates and the implementation of exchange controls, and
- limitations on our ability to reinvest earnings from operations in one country to fund the capital needs of our operations in other countries

As an example, we conduct business in countries, such as Venezuela, that have non-traded or "soft" currencies that, because of their restricted or limited trading markets, may be more difficult to exchange for "hard" currency. We may accumulate cash in soft currencies, and we may be limited in our ability to convert our profits into United States dollars or to repatriate the profits from those countries. In addition, we may accumulate cash in foreign jurisdictions that may be subject to taxation if repatriated to the United States. For further information, see "Management's Discussion and Analysis of Financial Condition and Results of Operations - Business Environment and Results of Operations" and Note 9 to the Consolidated Financial Statements, "Income Taxes."

Our failure to protect our proprietary information and any successful intellectual property challenges or infringement proceedings against us could materially and adversely affect our competitive position.

We rely on a variety of intellectual property rights that we use in our services and products. We may not be able to successfully preserve these intellectual property rights in the future, and these rights could be invalidated, circumvented, or challenged. In addition, the laws of some foreign countries in which our services and products may be sold do not protect intellectual property rights to the same extent as the laws of the United States. Our failure to protect our proprietary information and any successful intellectual property challenges or infringement proceedings against us could materially and adversely affect our competitive position.

If we are not able to design, develop, and produce commercially competitive products and to implement commercially competitive services in a timely manner in response to changes in the market, customer requirements, competitive pressures, and technology trends, our business and consolidated results of operations could be materially and adversely affected, and the value of our intellectual property may be reduced.

The market for our services and products is characterized by continual technological developments to provide better and more reliable performance and services. If we are not able to design, develop, and produce commercially competitive products and to implement commercially competitive services in a timely manner in response to changes in the market, customer requirements, competitive pressures, and technology trends, our business and consolidated results of operations could be materially and adversely affected, and the value of our intellectual property may be reduced. Likewise, if our proprietary technologies, equipment, facilities, or work processes become obsolete, we may no longer be competitive, and our business and consolidated results of operations could be materially and adversely affected.

If our customers delay paying or fail to pay a significant amount of our outstanding receivables, it could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

We depend on a limited number of significant customers. While none of these customers represented more than 10% of consolidated revenue in any period presented, the loss of one or more significant customers could have a material adverse effect on our business and our consolidated results of operations.

In most cases, we bill our customers for our services in arrears and are, therefore, subject to our customers delaying or failing to pay our invoices. In weak economic environments, we may experience increased delays and failures due to, among other reasons, a reduction in our customers' cash flow from operations and their access to the credit markets. If our customers delay paying or fail to pay us a significant amount of our outstanding receivables, it could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Our business in Venezuela subjects us to actions by the Venezuelan government and delays in receiving payments, which could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

We believe there are risks associated with our operations in Venezuela, including the possibility that the Venezuelan government could assume control over our operations and assets. We also continue to see a delay in receiving payment on our receivables from our primary customer in Venezuela. If our customer further delays paying or fails to pay us a significant amount of our outstanding receivables, it could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

The future results of our Venezuelan operations will be affected by many factors, including our ability to take actions to mitigate the effect of a devaluation of the Bolívar, the foreign currency exchange rate, actions of the Venezuelan government, and general economic conditions such as continued inflation and future customer payments and spending. For further information, see "Management's Discussion and Analysis of Financial Condition and Results of Operations - Business Environment and Results of Operations - International operations - Venezuela."

Some of our customers require bids for contracts in the form of long-term, fixed pricing contracts that may require us to assume additional risks associated with cost over-runs, operating cost inflation, labor availability and productivity, supplier and contractor pricing and performance, and potential claims for liquidated damages.

Some of our customers, primarily NOCs, may require bids for contracts in the form of long-term, fixed pricing contracts that may require us to provide integrated project management services outside our normal discrete business to act as project managers as well as service providers, and may require us to assume additional risks associated with cost over-runs. These customers may provide us with inaccurate information in relation to their reserves, which is a subjective process that involves location and volume estimation, that may result in cost over-runs, delays, and project losses. In addition, NOCs often operate in countries with unsettled political conditions, war, civil unrest, or other types of community issues. These issues may also result in cost over-runs, delays, and project losses.

Providing services on an integrated basis may also require us to assume additional risks associated with operating cost inflation, labor availability and productivity, supplier pricing and performance, and potential claims for liquidated damages. We rely on third-party subcontractors and equipment providers to assist us with the completion of these types of contracts. To the extent that we cannot engage subcontractors or acquire equipment or materials in a timely manner and on reasonable terms, our ability to complete a project in accordance with stated deadlines or at a profit may be impaired. If the amount we are required to pay for these goods and services exceeds the amount we have estimated in bidding for fixed-price work, we could experience losses in the performance of these contracts. These delays and additional costs may be substantial, and we may be required to compensate our customers for these delays. This may reduce the profit to be realized or result in a loss on a project.

Constraints in the supply of, prices for, and availability of transportation of raw materials can have a material adverse effect on our business and consolidated results of operations.

Raw materials essential to our business are normally readily available. High levels of demand for, or shortage of, raw materials, such as proppants, hydrochloric acid, and gels, including guar gum, can trigger constraints in the supply chain of those raw materials, particularly where we have a relationship with a single supplier for a particular resource. Many of the raw materials essential to our business require the use of rail, storage, and trucking services to transport the materials to our jobsites. These services, particularly during times of high demand, may cause delays in the arrival of or otherwise constrain our supply of raw materials. These constraints could have a material adverse effect on our business and consolidated results of operations. In addition, price increases imposed by our vendors for raw materials used in our business and the inability to pass these increases through to our customers could have a material adverse effect on our business and consolidated results of operations.

Our acquisitions, dispositions, and investments may not result in anticipated benefits and may present risks not originally contemplated, which may have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

We continually seek opportunities to maximize efficiency and value through various transactions, including purchases or sales of assets, businesses, investments or joint ventures. These transactions are intended to (but may not) result in the realization of savings, the creation of efficiencies, the offering of new products or services, the generation of cash or income, or the reduction of risk. Acquisition transactions may be financed by additional borrowings or by the issuance of our common stock. These transactions may also affect our liquidity, consolidated results of operations, and consolidated financial condition.

These transactions also involve risks, and we cannot ensure that

- any acquisitions would result in an increase in income or provide an adequate return of capital or other anticipated benefits,
- any acquisitions would be successfully integrated into our operations and internal controls,
- the due diligence conducted prior to an acquisition would uncover situations that could result in financial or legal exposure, including under the FCPA, or that we will appropriately quantify the exposure from known risks,
- any disposition would not result in decreased earnings, revenue, or cash flow,
- use of cash for acquisitions would not adversely affect our cash available for capital expenditures and other uses,
- any dispositions, investments, acquisitions, or integrations would not divert management resources, or
- any dispositions, investments, acquisitions, or integrations would not have a material adverse effect on our liquidity, consolidated results of operations, or consolidated financial condition.

Actions of and disputes with our joint venture partners could have a material adverse effect on the business and results of operations of our joint ventures and, in turn, our business and consolidated results of operations.

We conduct some operations through joint ventures, where control may be shared with unaffiliated third parties. As with any joint venture arrangement, differences in views among the joint venture participants may result in delayed decisions or in failures to agree on major issues. We also cannot control the actions of our joint venture partners, including any nonperformance, default, or bankruptcy of our joint venture partners. These factors could have a material adverse effect on the business and results of operations of our joint ventures and, in turn, our business and consolidated results of operations.

Our ability to operate and our growth potential could be materially and adversely affected if we cannot employ and retain technical personnel at a competitive cost.

Many of the services that we provide and the products that we sell are complex and highly engineered and often must perform or be performed in harsh conditions. We believe that our success depends upon our ability to employ and retain technical personnel with the ability to design, utilize, and enhance these services and products. In addition, our ability to expand our operations depends in part on our ability to increase our skilled labor force. A significant increase in the wages paid by competing employers could result in a reduction of our skilled labor force, increases in the wage rates that we must pay, or both. If either of these events were to occur, our cost structure could increase, our margins could decrease, and any growth potential could be impaired.

The loss or unavailability of any of our executive officers or other key employees could have a material adverse effect on our business.

We depend greatly on the efforts of our executive officers and other key employees to manage our operations. The loss or unavailability of any of our executive officers or other key employees could have a material adverse effect on our business.

Item 1(b). Unresolved Staff Comments.

None

Item 2. Properties.

We own or lease numerous properties in domestic and foreign locations. Our principal properties include manufacturing facilities, research and development laboratories, technology centers, and corporate offices. All of our owned properties are unencumbered.

The following locations represent our major facilities by segment:

<i>Completion and Production segment</i>	Arbroath, United Kingdom
	Johor, Malaysia
	Lafayette, Louisiana
	Singapore, Singapore
	Stavanger, Norway
	Tianjin, China
<i>Drilling and Evaluation segment</i>	Alvarado, Texas
	Nisku, Canada
	Singapore, Singapore
	The Woodlands, Texas
<i>Shared/corporate facilities</i>	Al-Khobar, Saudi Arabia
	Carrollton, Texas
	Denver, Colorado
	Dubai, United Arab Emirates
	Duncan, Oklahoma
	Houston, Texas
	Kuala Lumpur, Malaysia
	Panama City, Panama
	Pune, India
	Rio de Janeiro, Brazil
	San Antonio, Texas

In addition, we have 179 international and 124 United States field camps from which we deliver our services and products. We also have numerous small facilities that include sales, project, and support offices and bulk storage facilities throughout the world.

We believe all properties that we currently occupy are suitable for their intended use.

Item 3. Legal Proceedings.

Information related to Item 3 Legal Proceedings is included in Note 8 to the consolidated financial statements on page 55 of this annual report

Item 4. Mine Safety Disclosures.

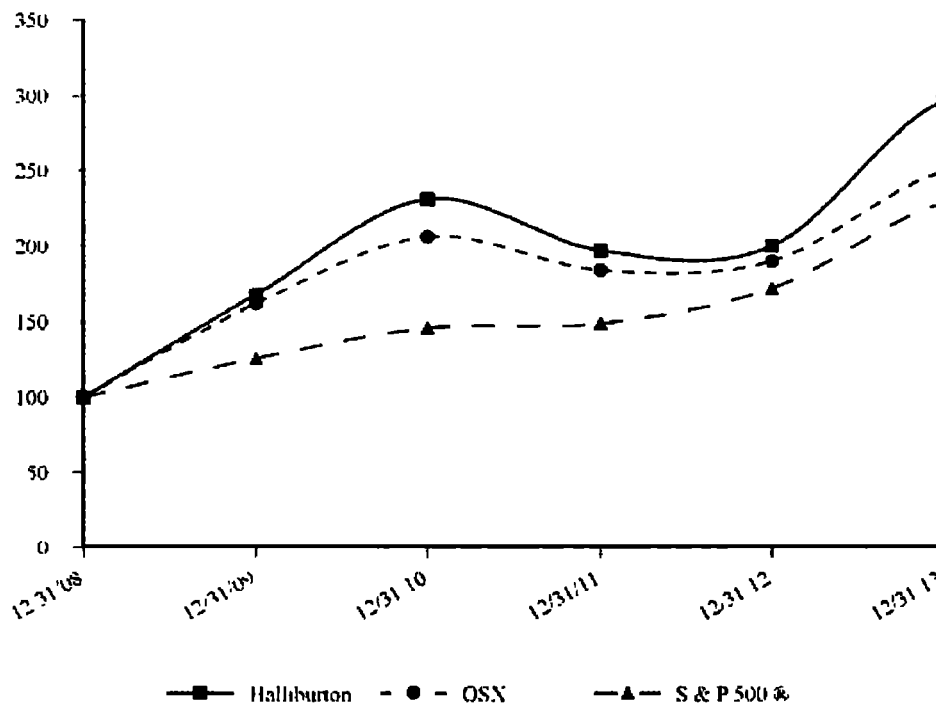
Our barite and bentonite mining operations in support of our fluid services business, are subject to regulation by the federal Mine Safety and Health Administration under the Federal Mine Safety and Health Act of 1977. Information concerning mine safety violations or other regulatory matters required by section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K (17 CFR 229.104) is included in Exhibit 9.5 to this annual report.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters, and Issuer Purchases of Equity Securities.

Halliburton Company's common stock is traded on the New York Stock Exchange. Information related to the high and low market prices of our common stock and quarterly dividend payments is included under the caption "Quarterly Data and Market Price Information" on page 74 of this annual report. Quarterly cash dividends on our common stock, which were paid in March, June, September, and December of each year, were \$0.09 per share throughout 2012, \$0.125 per share for the first three quarters of 2013, and \$0.15 per share in the fourth quarter of 2013. The declaration and payment of future dividends will be at the discretion of the Board of Directors and will depend on, among other things, future earnings, general financial condition and liquidity, success in business activities, capital requirements, and general business conditions. Subject to Board of Directors approval, our intention is to pay dividends representing at least 15% to 20% of our net income on an annual basis.

The following graph and table compare total shareholder return on our common stock for the five-year period ended December 31, 2013, with the Philadelphia Oil Service Index (OSX) and the Standard & Poor's 500® Index over the same period. This comparison assumes the investment of \$100 on December 31, 2008, and the reinvestment of all dividends. The shareholder return set forth is not necessarily indicative of future performance.



	December 31					
	2008	2009	2010	2011	2012	2013
Halliburton	\$ 100.00	\$ 168.12	\$ 230.75	\$ 196.85	\$ 200.13	\$ 296.19
Philadelphia Oil Service Index (OSX)	100.00	162.15	205.80	184.09	189.86	249.32
Standard & Poor's 500® Index	100.00	126.46	145.51	148.59	172.37	228.19

At January 31, 2014, there were 14,454 shareholders of record. In calculating the number of shareholders we consider clearing agencies and security position listings as one shareholder for each agency or listing.

The following table is a summary of repurchases of our common stock during the three-month period ended December 31, 2013:

Period	Total Number of Shares Purchased (a)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (b)	Maximum Number (or Approximate Dollar Value) of Shares that may yet be Purchased Under the Program (b)
October 1 - 31	73,993	\$49.96	—	\$1,693,971,527
November 1 - 30	80,870	\$53.43	—	\$1,693,971,527
December 1 - 31	140,739	\$50.41	—	\$1,693,971,527
Total	295,602	\$51.12	—	

- (a) All of the 295,602 shares purchased during the three-month period ended December 31, 2013 were acquired from employees in connection with the settlement of income tax and related benefit withholding obligations arising from vesting in restricted stock grants. These shares were not part of a publicly announced program to purchase common stock.
- (b) Our Board of Directors has authorized a plan to repurchase our common stock from time to time. During the fourth quarter of 2013, we did not repurchase shares of our common stock pursuant to that plan. We have authorization remaining to repurchase up to a total of approximately \$1.7 billion of our common stock.

Item 6. Selected Financial Data.

Information related to selected financial data is included on page 73 of this annual report.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

Information related to Management's Discussion and Analysis of Financial Condition and Results of Operations is included on pages 20 through 38 of this annual report.

Item 7(a). Quantitative and Qualitative Disclosures About Market Risk.

Information related to market risk is included in "Management's Discussion and Analysis of Financial Condition and Results of Operations - Financial Instrument Market Risk" on page 37 of this annual report and Note 13 to the consolidated financial statements on page 68 of this annual report.

Item 8. Financial Statements and Supplementary Data.

	Page No.
Management's Report on Internal Control Over Financial Reporting	<u>39</u>
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Consolidated Statements of Operations for the years ended December 31, 2013, 2012, and 2011	<u>42</u>
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Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosures.

None

Item 9(a). Controls and Procedures.

In accordance with the Securities Exchange Act of 1934 Rules 13a-15 and 15d-15, we carried out an evaluation under the supervision and with the participation of management including our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our disclosure controls and procedures as of the end of the period covered by this report. Based on that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2013 to provide reasonable assurance that information required to be disclosed in our reports filed or submitted under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in the Securities and Exchange Commission's rules and forms. Our disclosure controls and procedures include controls and procedures designed to ensure that information required to be disclosed in reports filed or submitted under the Exchange Act is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

There has been no change in our internal control over financial reporting that occurred during the three months ended December 31, 2013 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

See page 39 for Management's Report on Internal Control Over Financial Reporting and page 40 for Report of Independent Registered Public Accounting Firm on its assessment of our internal control over financial reporting.

Item 9(b). Other Information.

None

HALIBURTON COMPANY
Management's Discussion and Analysis of Financial Condition and Results of Operations

EXECUTIVE OVERVIEW

Financial results

During 2013, we produced revenue of \$29.4 billion and operating income of \$3.1 billion, reflecting an operating margin of 11%. Revenue increased \$0.9 billion, or 3%, from 2012, mainly due to increased activity in all of our international regions and the Gulf of Mexico. We set new revenue records this year in all of our international regions and in both of our divisions. Additionally, during 2013, our revenue outside of North America comprised 48% of consolidated revenue. The percentage of our revenue that relates to our international operations has been steadily increasing and is representative of our ongoing strategy to grow our international business and balance our geographic mix. Our increase in international activity and revenue was partially offset by lower activity levels and pricing pressure in the United States land market, primarily for production enhancement services. Operating income in 2013 was negatively impacted by a \$1.0 billion, pre-tax, Macondo-related loss contingency, as compared to a \$300 million, pre-tax, Macondo-related loss contingency in 2012.

Business outlook

We continue to believe in the strength of the long-term fundamentals of our business. Energy demand is expected to increase over the long term driven by economic growth in developing countries despite current underlying downside risks in the industry, such as sluggish growth in developed countries and uncertainties associated with geopolitical tensions in the Middle East and North Africa. Furthermore, development of new resources is expected to be more complex, resulting in higher service intensity as our customers move increasingly to horizontal drilling.

In North America, we continue to experience pricing pressures, which have impacted our margins. However, we believe the current environment and our focus on efficient cost structure continues to favor us. As a result of the industry's activity shift from natural gas plays to oil and liquids-rich basins, operators have been allocating their budgets to basins with better economics. In addition, we are observing a meaningful switch to multi-well pad activity among our customer base, which is resulting in increased drilling and completion service efficiency. We believe the incremental efficiency gains provided by multi-well pad drilling will enable us to leverage our operational scale and expertise.

Outside of North America, both revenue and operating income increased in 2013 compared to 2012. We believe that international growth in 2014 will come from volume increases as we deploy resources on our recent contract wins and new projects, continued improvement in markets where we have made strategic investments, the introduction of new technology, and increased pricing and cost recovery on select contracts. We also believe that international unconventional oil and natural gas, mature field, and deepwater projects will contribute to activity improvements over the long term, and we plan to leverage our extensive experience in North America to capitalize on these opportunities. Consistent with our long-term strategy to grow our operations outside of North America, we also expect to continue to invest in capital equipment for our international operations. In Latin America, we expect 2014 to be a challenging year due to a decline in existing integrated project management work in Mexico as we begin transitioning to newly-tendered projects, and due to reduced activity in Brazil. However, this does not change our long-term outlook for Latin America, which we expect to contribute significantly to our future growth and profitability.

We continued to execute several key initiatives in 2013. These initiatives included increasing manufacturing capacity in the Eastern Hemisphere and repositioning our service delivery platform to lower our delivery costs. We plan to continue to invest in these initiatives in 2014. In addition, we plan to continue executing the following strategies:

- focusing on unconventional plays, mature fields, and deepwater markets by leveraging our broad technology offerings to provide value to our customers through integrated solutions and the ability to more efficiently drill and complete their wells
- exploring opportunities for acquisitions that will enhance or augment our current portfolio of services and products, including those with unique technologies or distribution networks in areas where we do not already have large operations.
- making key investments in technology and infrastructure to maximize growth opportunities. To that end, we are continuing to push our technology and manufacturing capacity, as well as our supply chain, closer to our customers in the Eastern Hemisphere,
- improving working capital, and managing our balance sheet to maximize our financial flexibility. We are deploying a global project to improve service delivery that we expect to result in, among other things, additional investments in our systems and significant improvements to our current order-to-cash and purchase-to-pay processes,
- growing our international revenues and margins by continuing to invest capital and resources in these markets,
- improving our North America margins by leveraging technologies and reducing costs through more efficient operations,
- continuing to seek ways to be one of the most cost efficient service providers in the industry by maintaining capital discipline and leveraging our scale and breadth of operations, and
- expanding our business with national oil companies.

Our operating performance and business outlook are described in more detail in "Business Environment and Results of Operations."

Financial markets, liquidity, and capital resources

We believe we have invested our cash balances conservatively and secured sufficient financing to help mitigate any near-term negative impact on our operations from adverse market conditions. For additional information, see "Liquidity and Capital Resources" and "Business Environment and Results of Operations."

LIQUIDITY AND CAPITAL RESOURCES

We ended 2013 with cash and equivalents of \$2.4 billion compared to \$2.5 billion at December 31, 2012. Additionally, at December 31, 2013, we held \$373 million of investments in fixed income securities compared to \$398 million at December 31, 2012. These securities are reflected in "Other current assets" and "Other assets" in our consolidated balance sheets. As of December 31, 2013, approximately \$306 million of the \$2.4 billion of cash and equivalents was held by our foreign subsidiaries, and would be subject to United States tax if repatriated. However, our intent is to permanently reinvest these funds outside of the United States and our current plans do not suggest a need to repatriate them to fund our United States operations.

Significant sources and uses of cash

Cash flows from operating activities were \$4.4 billion in 2013.

In the third quarter of 2013, we issued \$3.0 billion aggregate principal amount of senior notes and used the net proceeds, along with cash on hand, to fund the repurchase of approximately 68 million shares of our common stock at an aggregate cost of \$3.3 billion pursuant to a modified Dutch auction cash tender offer. During 2013, we repurchased approximately 93 million shares of our common stock under our share repurchase program at a total cost of approximately \$4.4 billion.

Capital expenditures were \$2.9 billion in 2013. The capital expenditures in 2013 were predominantly made in our Production Enhancement, Sperry Drilling, Boots and Coots, Wireline and Perforating, and Cementing product service lines. We have also invested additional working capital to support the growth of our business.

We paid \$465 million of dividends to our shareholders in 2013. We increased our quarterly dividend rate by \$0.035 per share in the first quarter of 2013 and an additional \$0.025 per share in the fourth quarter of 2013. Our current quarterly dividend rate is \$0.15 per share, or approximately \$129 million per quarter, which represents a 67% increase over the quarterly dividend rate during 2012.

During 2013, we sold \$241 million of property, plant, and equipment.

Our primary components of net working capital (receivables, inventories and accounts payable) increased during the year by a net \$229 million, primarily due to increased business activity.

In the first quarter of 2013, we made a \$219 million payment under a guarantee we issued for the Banacuda-Caratunga project.

In the second quarter of 2013, we made a \$172 million earn-out payment related to a prior year acquisition due to significantly better than expected operating performance.

Future sources and uses of cash

Capital spending for 2014 is currently expected to be approximately \$3.0 billion. The capital expenditures plan for 2014 is primarily directed towards our Production Enhancement, Sperry Drilling, Cementing, Boots & Coots, and Wireline and Perforating product service lines, with an increasing amount dedicated to our international operations.

Subject to Board of Directors approval, our intention is to pay dividends representing at least 15% to 20% of our net income on an annual basis. We have approximately \$1.7 billion remaining available under our share repurchase authorization, which may be used for open market and other share repurchases.

During 2013, the Congressional Joint Committee on Taxation approved a \$135 million income tax refund, excluding interest, to us for agreed upon tax items for the tax years 2003 through 2009. We expect to receive the refund in 2014.

In the third quarter of 2013, we were awarded \$105 million by an arbitrator regarding amounts owed by KBR, Inc. (KBR) related to our Tax Sharing Agreement with KBR. KBR is contesting the award and, although the arbitrator recently issued a supplemental report that reaffirmed the original award, there is uncertainty as to the ultimate timing and amount of any payment. See Note 7 to the consolidated financial statements for further information.

We are continuing to explore opportunities for acquisitions that will enhance or augment our current portfolio of services and products, including those with unique technologies or distribution networks in areas where we do not already have significant operations.

We had \$209 million of gross unrecognized tax benefits at December 31, 2013, of which we estimate \$146 million may require a cash payment. We estimate that \$141 million of the cash payment will not be settled within the next 12 months. We are not able to reasonably estimate in which future periods any amounts will ultimately be settled and paid.

Contractual obligations

The following table summarizes our significant contractual obligations and other long-term liabilities as of December 31, 2013

Millions of dollars	Payments Due						Total
	2014	2015	2016	2017	2018	Thereafter	
Long-term debt	\$ —	\$ —	\$ 600	\$ 45	\$ 800	\$ 6,389	\$ 7,834
Interest on debt (a)	362	365	376	385	398	6,422	8,308
Operating leases	282	215	156	83	56	154	946
Purchase obligations (b)	2,382	450	315	225	76	96	3,544
Other long-term liabilities (c)	39	3	3	3	2	4	54
Total	\$ 3,065	\$ 1,033	\$ 1,450	\$ 741	\$ 1,332	\$ 13,065	\$ 20,686

- (a) Interest on debt includes 83 years of interest on \$300 million of debentures at 7.6% interest that become due in 2096
- (b) Amount in 2014 primarily represents certain purchase orders for goods and services utilized in the ordinary course of our business
- (c) Includes capital lease obligations and pension funding obligations. Amounts for pension funding obligations, which include international plans and are based on assumptions that are subject to change, are only included for 2014 as we are currently not able to reasonably estimate our contributions for years after 2014

Other factors affecting liquidity

Financial position in current market As of December 31, 2013, we had \$2.4 billion of cash and equivalents, \$373 million in fixed income investments, and a total of \$3.0 billion of available committed bank credit under our revolving credit facility. Reflecting the growth of our company, we executed an amendment to our revolving credit facility during 2013, which increased the capacity from \$2.0 billion to \$3.0 billion and extended the maturity to 2018. Furthermore, we have no financial covenants or material adverse change provisions in our bank agreements, and our debt maturities extend over a long period of time. Although a portion of earnings from our foreign subsidiaries is reinvested outside the United States indefinitely, we do not consider this to have a significant impact on our liquidity. We currently believe that capital expenditures, working capital investments, and dividends, if any, in 2014 can be fully funded through cash from operations.

As a result, we believe we have a reasonable amount of liquidity and, if necessary, additional financing flexibility given the current market environment to fund our potential contingent liabilities, if any. However, as discussed in Note 8 to the consolidated financial statements, there are numerous future developments that may arise as a result of the Macondo well incident that could have a material adverse effect on our liquidity.

Guarantee agreements In the normal course of business, we have agreements with financial institutions under which approximately \$2.1 billion of letters of credit, bank guarantees, or surety bonds were outstanding as of December 31, 2013. Some of the outstanding letters of credit have triggering events that would entitle a bank to require cash collateralization.

Credit ratings Credit ratings for our long-term debt remain A2 with Moody's Investors Service and A with Standard & Poor's. The credit ratings on our short-term debt remain P-1 with Moody's Investors Service and A-1 with Standard & Poor's.

Customer receivables In line with industry practice, we bill our customers for our services in arrears and are, therefore, subject to our customers delaying or failing to pay our invoices. In weak economic environments, we may experience increased delays and failures to pay our invoices due to, among other reasons, a reduction in our customers' cash flow from operations and their access to the credit markets as well as unsettled political conditions. If our customers delay paying or fail to pay us a significant amount of our outstanding receivables, it could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition. See "Business Environment and Results of Operations – International operations – Venezuela" for further discussion related to Venezuela.

BUSINESS ENVIRONMENT AND RESULTS OF OPERATIONS

We operate in approximately 80 countries throughout the world to provide a comprehensive range of discrete and integrated services and products to the energy industry. A significant amount of our consolidated revenue is derived from the sale of services and products to major, national, and independent oil and natural gas companies worldwide. We serve the upstream oil and natural gas industry throughout the lifecycle of the reservoir, from locating hydrocarbons and managing geological data, to drilling and formation evaluation, well construction and completion, and optimizing production throughout the life of the field. Our two business segments are the Completion and Production segment and the Drilling and Evaluation segment. The industry we serve is highly competitive with many substantial competitors in each segment. In 2013, 2012, and 2011, based on the location of services provided and products sold, 49%, 53% and 55% of our consolidated revenue was from the United States. No other country accounted for more than 10% of our revenue during these periods.

Operations in some countries may be adversely affected by unsettled political conditions, acts of terrorism, civil unrest, force majeure, war or other armed conflict, expropriation or other governmental actions, inflation, foreign currency exchange restrictions, and highly inflationary currencies, as well as other geopolitical factors. We believe the geographic diversification of our business activities reduces the risk that loss of operations in any one country, other than the United States, would be materially adverse to our consolidated results of operations.

Activity levels within our business segments are significantly impacted by spending on upstream exploration, development, and production programs by our customers. Also impacting our activity is the status of the global economy, which impacts oil and natural gas consumption.

Some of the more significant determinants of current and future spending levels of our customers are oil and natural gas prices, the world economy, the availability of credit, government regulation, and global stability, which together drive worldwide drilling activity. Our financial performance is significantly affected by oil and natural gas prices and worldwide rig activity, which are summarized in the following tables. Additionally, due to improved drilling and completion efficiencies as more of our customers move to multi-well pad drilling, our financial performance is impacted by well count in the North America market.

The following table shows the average oil and natural gas prices for West Texas Intermediate (WTI), United Kingdom Brent crude oil, and Henry Hub natural gas.

	2013	2012	2011
Oil price - WTI ⁽¹⁾	\$ 97.99	\$ 94.15	\$ 95.13
Oil price - Brent ⁽¹⁾	108.71	111.60	111.53
Natural gas price - Henry Hub ⁽²⁾	3.73	2.81	4.09

⁽¹⁾ Oil price measured in dollars per barrel.

⁽²⁾ Natural gas price measured in dollars per thousand cubic feet, or Mcf.

The historical yearly average rig counts based on the Baker Hughes Incorporated rig count information were as follows

Land vs. Offshore	2013	2012	2011
United States			
Land	1,705	1,872	1,843
Offshore (incl. Gulf of Mexico)	56	47	32
Total	1,761	1,919	1,875
Canada			
Land	352	363	422
Offshore	2	1	1
Total	354	364	423
International (excluding Canada)			
Land	978	931	863
Offshore	318	303	304
Total	1,296	1,234	1,167
Worldwide total	3,411	3,517	3,465
Land total	3,035	3,166	3,128
Offshore total	376	351	337
Oil vs. Natural Gas	2013	2012	2011
United States (incl. Gulf of Mexico)			
Oil	1,375	1,359	984
Natural gas	386	560	891
Total	1,761	1,919	1,875
Canada			
Oil	234	261	282
Natural gas	120	103	141
Total	354	364	423
International (excluding Canada)			
Oil	1,029	984	918
Natural gas	267	250	249
Total	1,296	1,234	1,167
Worldwide total	3,411	3,517	3,465
Oil total	2,638	2,604	2,184
Natural gas total	773	913	1,281
Drilling Type	2013	2012	2011
United States (incl. Gulf of Mexico)			
Horizontal	1,102	1,151	1,074
Vertical	435	552	571
Directional	224	216	230
Total	1,761	1,919	1,875

Our customers' cash flows, in most instances, depend upon the revenue they generate from the sale of oil and natural gas. Lower oil and natural gas prices usually translate into lower exploration and production budgets, while the opposite is true for higher oil and natural gas prices.

WTI oil prices which generally influence customer spending in North America, fluctuated throughout 2013, ranging from a high of \$111 per barrel in September to a low of \$87 per barrel in April. Outside of North America, customer spending is heavily influenced by Brent oil prices, which fluctuated during 2013 from a high of \$119 per barrel in February to a low of \$97 per barrel in April. Oil prices were affected by production disruptions in Libya, Nigeria, and Iraq, offset by growing output by certain OPEC members. Global oil demand growth appears to have gradually gained momentum in the past 18 months and the International Energy Agency's January 2014 "Oil Market Report" forecasts a 1% increase in global petroleum demand from 2013 levels. This is driven by economic recovery in the developed world and an increase in all regions except for Europe, which is forecasted to remain flat.

Henry Hub natural gas prices in the United States have increased approximately 33% from 2012 as a result of an increase in storage withdrawals due to cooler temperatures in the early part and December of 2013. This, coupled with higher natural gas demand for industrial purposes, resulted in higher natural gas prices. Natural gas prices during 2013 ranged from a low of \$3.08 per Mcf in January to a high of \$4.52 per Mcf in December. The United States Energy Information Administration (EIA) January 2014 "Short Term Energy Outlook" forecast projects Henry Hub natural gas prices to average \$3.89 per Mcf in 2014 compared to \$3.73 per Mcf in 2013. Over the long term, the EIA expects natural gas consumption in the power sector to increase to offset the retirement of coal power plants.

There has been an increase in natural gas prices over the past year and the global economy continues to recover. We believe that, over the long-term, hydrocarbon demand will generally increase, and this, combined with the underlying trends of smaller and more complex reservoirs, high depletion rates, and the need for continual reserve replacement, should drive the long-term need for our services and products.

North America operations

Volatility in oil and natural gas prices can impact our customers' drilling and production activities. During 2013, the average natural gas-directed rig count in North America fell by 157 rigs, or 24%, from 2012 levels. The curtailment of natural gas drilling activity along with an influx of stimulation equipment into the industry has resulted in overcapacity and pricing pressure for hydraulic fracturing and other services. Despite the decreased rig count in the United States as compared to 2012, drilling efficiencies and the trend toward multi-well pads are driving a more robust well count. Additionally, operators have been, in some cases, increasing the numbers of hydraulic fracturing stages on horizontal wells.

We expect United States land rig count to modestly increase from 2013 levels, driven primarily by the continued shift to horizontal rigs in the Permian Basin. We are seeing higher well efficiencies due to increased pad drilling, more 24-hour operations, rig fleet upgrades, and significant advancements in drilling and completion technologies. In 2013, we saw average drilling days per horizontal well drop approximately 14% compared to 2012 and we anticipate continued efficiency improvements in 2014. We believe this continued shift towards efficiency will bode well for us in the coming years. In the long run, we believe the shift to unconventional oil and liquids-rich basins in North America will continue to drive increased service intensity and will require higher demand in fluid chemistry and other technologies required for these complex reservoirs which will have beneficial implications for our operations.

In the Gulf of Mexico, improvements in the performance of many of our product service lines was due to a 19% increase in the offshore rig count from 2012, in addition to the efficiencies and integrated solutions we offer that save our customers time and enhance productivity. Over the long term, the continued growth in the Gulf of Mexico is dependent on, among other things, governmental approvals for permits, our customers' actions, and new deepwater rigs entering the market.

International operations

The industry experienced steady volume increases during 2013, with the average international rig count improving 5% over 2012 levels. These volume increases have led to an absorption of equipment supply and we are seeing sporadic opportunities for price improvements in select geographies. We anticipate moderate margin improvements and gradual activity increases in the Eastern Hemisphere, although the operator spending outlook could be impacted by ongoing macroeconomic concerns. We believe 2014 will be a challenging year for Latin America, primarily in Brazil and Mexico. Over the long term, however, we expect both of these countries to be strong contributors to our growth and profitability.

We believe that international growth in 2014 will come from volume increases as we deploy resources on our recent contract and project wins, continued improvement in certain markets where we have made strategic investments, introduction of new technology, and increased pricing and cost recovery on select contracts. We also believe that international unconventional oil and natural gas, mature field, and deepwater projects will contribute to activity improvements over the long term, and we plan to leverage our extensive experience in North America to optimize these opportunities. Consistent with our long-term strategy to grow our operations outside of North America, we also expect to continue to invest in capital equipment for our international operations.

Venezuela As of December 31, 2013, our total net investment in Venezuela was approximately \$411 million, including net monetary assets of \$124 million denominated in Bolivares. Also, at December 31, 2013, we had \$192 million of surety bond guarantees outstanding relating to our Venezuelan operations.

We continue to experience delays in collecting payment on our receivables from our primary customer in Venezuela. These receivables are not disputed and we have not historically had material write-offs relating to this customer. Additionally, we routinely monitor the financial stability of our customers. Our total outstanding trade receivables in Venezuela were \$486 million, or approximately 8% of our gross trade receivables, as of December 31, 2013, compared to \$491 million, or approximately 9% of our gross trade receivables, as of December 31, 2012. Of the \$486 million of receivables in Venezuela as of December 31, 2013, \$183 million has been classified as long-term and included within "Other assets" on our consolidated balance sheets. Of the \$491 million receivables in Venezuela as of December 31, 2012, \$143 million has been classified as long-term and included within "Other assets" on our consolidated balance sheets.

In February 2013, the Venezuelan government devalued the Bolívar, from the preexisting exchange rate of 4.3 Bolivares per United States dollar to 6.3 Bolivares per United States dollar, resulting in us incurring a foreign currency loss. The net foreign currency impact of Bolívar activity in the first quarter of 2013 was not material, although further devaluation of the Bolívar could impact our operations. For additional information, see Part I, Item 1(a), "Risk Factors" in this Form 10-K.

RESULTS OF OPERATIONS IN 2013 COMPARED TO 2012

REVENUE:				Favorable	Percentage
<i>Millions of dollars</i>	2013	2012	(Unfavorable)	Change	
Completion and Production	\$ 17,506	\$ 17,380	\$ 126		1 %
Drilling and Evaluation	11,896	11,123	773		7
Total revenue	\$ 29,402	\$ 28,503	\$ 899		3 %
By geographic region					
Completion and Production:					
North America	\$ 11,417	\$ 12,157	(740)		(6)%
Latin America	1,586	1,415	171		12
Europe/Africa/CIS	2,391	2,099	292		14
Middle East/Asia	2,112	1,709	403		24
Total	17,506	17,380	126		1
Drilling and Evaluation					
North America	3,795	3,847	(52)		(1)
Latin America	2,323	2,279	44		2
Europe/Africa/CIS	2,834	2,411	423		18
Middle East/Asia	2,944	2,586	358		14
Total	11,896	11,123	773		7
Total revenue by region:					
North America	15,212	16,004	(792)		(5)
Latin America	3,909	3,694	215		6
Europe/Africa/CIS	5,225	4,510	715		16
Middle East/Asia	5,056	4,295	761		18

OPERATING INCOME:

<i>Millions of dollars</i>	2013	2012	Favorable (Unfavorable)	Percentage Change
Completion and Production	\$ 2,875	\$ 3,144	\$ (269)	(9)%
Drilling and Evaluation	1,770	1,675	95	6
Corporate and other	(1,507)	(660)	(847)	128
Total operating income	\$ 3,138	\$ 4,159	\$ (1,021)	(25)%

By geographic region

Completion and Production				
North America	\$ 1,916	\$ 2,260	\$ (344)	(15)%
Latin America	211	206	5	2
Europe/Africa/CIS	356	347	9	3
Middle East/Asia	392	331	61	18
Total	2,875	3,144	(269)	(9)
Drilling and Evaluation				
North America	656	680	(24)	(4)
Latin America	307	393	(86)	(22)
Europe/Africa/CIS	334	246	88	36
Middle East/Asia	473	356	117	33
Total	1,770	1,675	95	6
Total operating income by region (excluding Corporate and other)				
North America	2,572	2,940	(368)	(13)
Latin America	518	599	(81)	(14)
Europe/Africa/CIS	690	593	97	16
Middle East/Asia	865	687	178	26

Consolidated revenue in 2013 increased 3% compared to 2012, primarily driven by activity growth across all international regions. This was partially offset by lower activity levels and pricing pressure in the United States land market. Revenue outside of North America was 48% of consolidated revenue in 2013 and 44% of consolidated revenue in 2012.

The \$1.0 billion decrease in consolidated operating income compared to 2012 was primarily related to Macondo-related charges. Operating income in 2013 was impacted by the following pre-tax items: a \$1.0 billion Macondo-related loss contingency, \$92 million of restructuring charges related to severance and asset write-offs, and a \$55 million charge related to a charitable contribution to the National Fish and Wildlife Foundation, partially offset by a \$28 million value-added tax refund receivable in Brazil. Operating income in 2012 was impacted by the following pre-tax items: a \$300 million Macondo-related loss contingency, along with a \$48 million charge related to an earn-out adjustment due to significantly better than expected performance of a past acquisition, partially offset by a \$20 million gain related to the settlement of a patent infringement lawsuit.

Following is a discussion of our results of operations by reportable segment.

Completion and Production revenue increased slightly compared to 2012 due to strong international growth, which was partially offset by a decline in North America activity. North America revenue decreased 6%, primarily due to pricing pressures in the United States hydraulic fracturing market and lower activity in Canada. Latin America revenue was up 12% due to increased completion tools sales in Brazil and higher activity in most product service lines in Mexico and Argentina. Europe/Africa/CIS revenue grew 14%, driven by strong demand for cementing services in Norway, West Africa, and Russia and completion tools throughout the region. Middle East/Asia revenue improved 24% due to higher activity in most product service lines in Saudi Arabia, Australia, Indonesia, and China, increased completion tools sales in Malaysia, and higher demand for cementing services in Thailand. Revenue outside of North America was 35% of total segment revenue in 2013 and 30% of total segment revenue in 2012.

Completion and Production operating income decreased 9% compared to 2012, primarily due to the North America region, where operating income fell 15% due to pricing pressures in the United States hydraulic fracturing market and lower activity in Canada. Latin America operating income was up 2% as a result of higher demand for cementing services in Mexico and Venezuela and production enhancement services in Argentina. Europe/Africa/CIS operating income grew 3% compared to 2012, driven by higher completion tools activity in Angola and cementing activity in Norway. Middle East/Asia operating income increased 18% due to higher activity levels in Saudi Arabia and Iraq, higher direct sales in China, and improved profitability in Indonesia.

Drilling and Evaluation revenue increased 7% compared to 2012, driven by strong results in the Eastern Hemisphere. North America revenue was essentially flat, as lower demand for drilling and wireline services was partially offset by fluids activity across the United States land market and higher activity in the Gulf of Mexico. Latin America revenue was also relatively flat, as higher demand for all product lines in Mexico and fluids throughout the region were partially offset by lower drilling services activity in Colombia and wireline activity in Brazil. Europe/Africa/CIS revenue increased 18% due to improved fluids activity in Norway and Angola and higher drilling services activity in Eurasia, Norway, Egypt, and Angola. Middle East/Asia revenue rose 14% primarily due to strong demand in Saudi Arabia and Indonesia, higher drilling activity throughout the region, and higher wireline activity in Asia Pacific. Revenue outside of North America was 68% of total segment revenue in 2013 and 65% of total segment revenue in 2012.

Drilling and Evaluation operating income improved 6% compared to 2012, as increased activity in the Eastern Hemisphere was partially offset by higher costs in Latin America. North America operating income was down 4% from 2012, as a reduction in drilling and wireline services was partially offset by demand for fluids and consulting and project management. Latin America operating income declined 22% due to higher costs in Brazil and Venezuela and lower activity in Colombia. The Europe/Africa/CIS region operating income grew 36%, driven by fluids activity in Angola and Norway and drilling services in Eurasia. Middle East/Asia operating income increased 33% as a result of higher activity in Iraq, Indonesia, and Malaysia.

Corporate and other expenses were \$1.5 billion in 2013 compared to \$660 million in 2012. The significant increase was primarily due to a \$1.0 billion Macondo-related loss contingency that was recorded in the first quarter of 2013, compared to a \$300 million Macondo-related loss contingency recorded in the first quarter of 2012. Additionally, a \$55 million charitable contribution to the National Fish and Wildlife Foundation was expensed in the second quarter of 2013, reflecting our commitment to making a positive environmental impact in our local communities.

NONOPERATING ITEMS

Effective tax rate Our effective tax rate on continuing operations was 23.5% for 2013 and 32.3% for 2012. The 2013 effective tax rate on continuing operations was positively impacted by several items during the year, including federal tax benefits of approximately \$50 million due to the reinstatement of certain tax benefits and credits related to the first quarter enactment of the American Taxpayer Relief Act of 2012. Also contributing to the lower tax rate in 2013 was a \$1.0 billion loss contingency related to the Macondo well incident, which was tax-effected at the United States statutory rate, as well as some favorable tax items in Latin America in the fourth quarter. Additionally, our effective tax rate was positively impacted by lower tax rates in certain foreign jurisdictions, as we continue to reposition our technology, supply chain, and manufacturing infrastructure to more effectively serve our customers internationally.

RESULTS OF OPERATIONS IN 2012 COMPARED TO 2011

REVENUE:

<i>Millions of dollars</i>	2012	2011	Favorable (Unfavorable)	Percentage Change
Completion and Production	\$ 17,380	\$ 15,143	\$ 2,237	15%
Drilling and Evaluation	11,123	9,686	1,437	15
Total revenue	\$ 28,503	\$ 24,829	\$ 3,674	15%

By geographic region

Completion and Production				
North America	\$ 12,157	\$ 10,907	\$ 1,250	11%
Latin America	1,415	1,117	298	27
Europe/Africa/CIS	2,099	1,746	353	20
Middle East/Asia	1,709	1,373	336	24
Total	17,380	15,143	2,237	15
Drilling and Evaluation				
North America	3,847	3,506	341	10
Latin America	2,279	1,865	414	22
Europe/Africa/CIS	2,411	2,210	201	9
Middle East/Asia	2,586	2,105	481	23
Total	11,123	9,686	1,437	15
Total revenue by region				
North America	16,004	14,413	1,591	11
Latin America	3,694	2,982	712	24
Europe/Africa/CIS	4,510	3,956	554	14
Middle East/Asia	4,295	3,478	817	23

CRITICAL ACCOUNTING ESTIMATES

The preparation of financial statements requires the use of judgments and estimates. Our critical accounting policies are described below to provide a better understanding of how we develop our assumptions and judgments about future events and related estimations and how they can impact our financial statements. A critical accounting estimate is one that requires our most difficult, subjective, or complex judgments and assessments and is fundamental to our results of operations. We identified our most critical accounting estimates to be:

- forecasting our effective income tax rate, including our future ability to utilize foreign tax credits and the realizability of deferred tax assets

By geographic region

Completion and Production

North America	\$ 2,260	\$ 3,341	\$ (1,081)	(32)%
Latin America	206	159	47	30
Europe/Africa/CIS	347	48	299	623
Middle East/Asia	331	185	146	79
Total	3,144	3,733	(589)	(16)

Drilling and Evaluation

North America	680	641	39	6
Latin America	393	305	88	29
Europe/Africa/CIS	246	191	55	29
Middle East/Asia	356	266	90	34
Total	1,675	1,403	272	19

Total operating income by region

(excluding Corporate and other)

North America	2,940	3,982	(1,042)	(26)
Latin America	599	464	135	29
Europe/Africa/CIS	593	239	354	148
Middle East/Asia	687	451	236	52

The 15% increase in consolidated revenue in 2012 compared to 2011 was primarily due to higher activity in Latin America, Middle East/Asia, and North America. On a consolidated basis, all product service lines experienced revenue growth from 2011. Revenue outside of North America was 44% of consolidated revenue in 2012 and 42% of consolidated revenue in 2011.

The 12% decrease in consolidated operating income compared to 2011 was mainly due to higher costs, particularly of guar gum, and pricing pressure for production enhancement services in North America. Operating income in 2012 was negatively impacted by a \$300 million, pre-tax, loss contingency related to the Macondo well incident reflected in Corporate and other expenses. Additionally, our results were impacted by a \$48 million, pre-tax, charge related to an earn-out adjustment due to significantly better than expected performance of a past acquisition in the Latin America and North America regions as well as a \$20 million, pre-tax, gain related to the settlement of a patent infringement lawsuit that was recorded in Corporate and other expense. Operating income in 2011 was adversely impacted by a \$25 million, pre-tax, impairment charge on an asset held for sale in the Europe/Africa/CIS region, \$11 million, pre-tax, of employee separation costs in the Eastern Hemisphere, and a \$59 million, pre-tax, charge in Libya, to reserve for certain doubtful accounts receivable and inventory. During 2012, we received \$42 million related to the Libya reserve that was established in 2011 for receivables.

Following is a discussion of our results of operations by reportable segment.

Completion and Production revenue increased in all geographic regions compared to 2011, with strong international growth. North America revenue rose 11%, primarily due to increased cementing services and completions tools sales, as well as higher activity in production enhancement from an increased demand for hydraulic fracturing in the United States. Latin America revenue increased 27% due to improved activity in most product service lines in Mexico, Brazil, and Venezuela. Europe/Africa/CIS revenue increased 20%, driven by strong demand for completion tools across the region and increased cementing services in Mozambique and Nigeria. Middle East/Asia revenue grew 24% due to higher activity in all product service lines in Australia, Malaysia, and Indonesia, partially offset by lower completion tools sales in China and decreased activity in Singapore. Revenue outside of North America was 30% of total segment revenue in 2012 and 28% of total segment revenue in 2011.

The Completion and Production segment operating income decrease compared to 2011 was primarily due to the North America region, where operating income fell \$1.1 billion as a result of pricing pressure in the production enhancement product service line and rising costs, particularly related to guar gum. Latin America operating income increased 30% due to higher demand for completion tools in Mexico and Brazil, partially offset by higher costs and pricing adjustments in Argentina and Colombia. Europe/Africa/CIS operating income grew \$299 million compared to 2011 due to the recovery from activity disruptions in North Africa, including collections in 2012 of \$29 million from the original \$36 million Libya-related reserve recognized in 2011 for certain accounts receivable and inventory. Middle East/Asia operating income increased 79% due to cost controls in Iraq, higher activity levels in Oman, and increased demand for production enhancement and cementing services in Australia.

Drilling and Evaluation revenue increased 15% compared to 2011 as drilling activity improved across all regions, especially Middle East/Asia and Latin America. North America revenue grew 10% due to increased demand for drilling fluids. Latin America revenue increased 22% due to higher demand in most product services lines in Brazil, Mexico, Venezuela, and Colombia. Europe/Africa/CIS revenue increased 9% due to improved drilling service in Tanzania, Nigeria, and the United Kingdom, partially offset by service disruptions in Algeria. Middle East/Asia revenue rose 23% primarily due to the ongoing work in Iraq and Saudi Arabia, increased activity in Malaysia, and higher wireline direct sales. Revenue outside North America was 65% of total segment revenue in 2012 and 64% of total segment revenue in 2011.

Segment operating income compared to 2011 increased 19%, primarily due to increased activity in Middle East/Asia and Latin America. North America operating income increased 6% from increased demand for drilling fluids and wireline and perforating, which offset higher consulting and project management costs. Latin America operating income grew 29% as a result of activity increases in Mexico, Venezuela, and Brazil. The Europe/Africa/CIS region operating income grew 29% due to greater activity in Nigeria and the recovery in Libya where \$13 million of the original \$23 million reserve from 2011 mentioned above was collected in 2012, which more than offset higher costs in Norway. Middle East/Asia operating income increased 34% mainly due to increased activity in Malaysia and Saudi Arabia.

Corporate and other expenses were \$660 million in 2012 compared to \$399 million in 2011. The 65% increase was primarily due to a \$300 million, pre-tax, loss contingency recorded in 2012 related to the Macondo well incident as well as additional expenses in 2012 associated with strategic investments in our operating model and creating competitive advantages by repositioning our technology, supply chain, and manufacturing infrastructure. These items were partially offset by, among other things, a \$20 million, pre-tax, gain recorded in 2012 related to the settlement of a patent infringement lawsuit.

NONOPERATING ITEMS

Income (loss) from discontinued operations, net increased \$224 million in 2012 compared to 2011, primarily due to a \$163 million charge, after-tax, recognized in 2011 for an arbitration award against our former subsidiary, KBR, relating to the Barracuda-Caratinga project, a project for which we had provided a guarantee of KBR's obligations. In 2012, we recorded an \$80 million tax benefit in discontinued operations related to the \$219 million payment we made to Barracuda & Caratinga Leasing Company BV under that guarantee.

CRITICAL ACCOUNTING ESTIMATES

The preparation of financial statements requires the use of judgments and estimates. Our critical accounting policies are described below to provide a better understanding of how we develop our assumptions and judgments about future events and related estimations and how they can impact our financial statements. A critical accounting estimate is one that requires our most difficult, subjective, or complex judgments and assessments and is fundamental to our results of operations. We identified our most critical accounting estimates to be:

- forecasting our effective income tax rate, including our future ability to utilize foreign tax credits and the realizability of deferred tax assets, and providing for uncertain tax positions,
- legal, environmental, and investigation matters,
- valuations of long-lived assets, including intangible assets and goodwill,
- purchase price allocation for acquired businesses,
- pensions,
- allowance for bad debts, and
- percentage-of-completion accounting for long-term, integrated project management contracts

We base our estimates on historical experience and on various other assumptions we believe to be reasonable according to the current facts and circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We believe the following are the critical accounting policies used in the preparation of our consolidated financial statements, as well as the significant estimates and judgments affecting the application of these policies. This discussion and analysis should be read in conjunction with our consolidated financial statements and related notes included in this report.

We have discussed the development and selection of these critical accounting policies and estimates with the Audit Committee of our Board of Directors, and the Audit Committee has reviewed the disclosure presented below.

Income tax accounting

We recognize the amount of taxes payable or refundable for the current year and use an asset and liability approach in recognizing the amount of deferred tax liabilities and assets for the future tax consequences of events that have been recognized in our financial statements or tax returns. We apply the following basic principles in accounting for our income taxes:

- a current tax liability or asset is recognized for the estimated taxes payable or refundable on tax returns for the current year,
- a deferred tax liability or asset is recognized for the estimated future tax effects attributable to temporary differences and carryforwards,
- the measurement of current and deferred tax liabilities and assets is based on provisions of the enacted tax law, and the effects of potential future changes in tax laws or rates are not considered, and
- the value of deferred tax assets is reduced, if necessary, by the amount of any tax benefits that, based on available evidence, are not expected to be realized.

We determine deferred taxes separately for each tax-paying component (an entity or a group of entities that is consolidated for tax purposes) in each tax jurisdiction. That determination includes the following procedures:

- identifying the types and amounts of existing temporary differences,
- measuring the total deferred tax liability for taxable temporary differences using the applicable tax rate,
- measuring the total deferred tax asset for deductible temporary differences and operating loss carryforwards using the applicable tax rate,
- measuring the deferred tax assets for each type of tax credit carryforward, and
- reducing the deferred tax assets by a valuation allowance if, based on available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized.

Our methodology for recording income taxes requires a significant amount of judgment in the use of assumptions and estimates. Additionally, we use forecasts of certain tax elements, such as taxable income and foreign tax credit utilization, as well as evaluate the feasibility of implementing tax planning strategies. Given the inherent uncertainty involved with the use of such variables, there can be significant variation between anticipated and actual results. Unforeseen events may significantly impact these variables, and changes to these variables could have a material impact on our income tax accounts related to both continuing and discontinued operations.

We have operations in approximately 80 countries. Consequently, we are subject to the jurisdiction of a significant number of taxing authorities. No single jurisdiction has a disproportionately low tax rate. The income earned in these various jurisdictions is taxed on differing bases, including income actually earned, income deemed earned, and revenue-based tax withholding. The final determination of our income tax liabilities involves the interpretation of local tax laws, tax treaties, and related authorities in each jurisdiction. Changes in the operating environment, including changes in tax law and currency/repatriation controls, could impact the determination of our income tax liabilities for a tax year.

Tax filings of our subsidiaries, unconsolidated affiliates, and related entities are routinely examined in the normal course of business by tax authorities. These examinations may result in assessments of additional taxes, which we work to resolve with the tax authorities and through the judicial process. Predicting the outcome of disputed assessments involves some uncertainty. Factors such as the availability of settlement procedures, willingness of tax authorities to negotiate, and the operation and impartiality of judicial systems vary across the different tax jurisdictions and may significantly influence the ultimate outcome. We review the facts for each assessment and then utilize assumptions and estimates to determine the most likely outcome and provide taxes, interest, and penalties as needed based on this outcome. We provide for uncertain tax positions pursuant to current accounting standards, which prescribe a minimum recognition threshold and measurement methodology that a tax position taken or expected to be taken in a tax return is required to meet before being recognized in the financial statements. The standards also provide guidance for derecognition classification, interest and penalties, accounting in interim periods, disclosure, and transition.

Legal, environmental, and investigation matters

As discussed in Note 8 of our consolidated financial statements, as of December 31, 2013, we have accrued an estimate of the probable and estimable costs for the resolution of some of our legal, environmental, and investigation matters. For other matters for which the liability is not probable and reasonably estimable, we have not accrued any amounts. Attorneys in our legal department monitor and manage all claims filed against us and review all pending investigations. Generally, the estimate of probable costs related to these matters is developed in consultation with internal and outside legal counsel representing us. Our estimates are based upon an analysis of potential results, assuming a combination of litigation and settlement strategies. The accuracy of these estimates is impacted by, among other things, the complexity of the issues and the amount of due diligence we have been able to perform. We attempt to resolve these matters through settlements, mediation, and arbitration proceedings when possible. If the actual settlement costs, final judgments, or fines, after appeals, differ from our estimates, our future financial results may be adversely affected. We have in the past recorded significant adjustments to our initial estimates of these types of contingencies.

Value of long-lived assets, including intangible assets and goodwill

We carry a variety of long-lived assets on our balance sheet including property, plant and equipment, goodwill, and other intangibles. We conduct impairment tests on long-lived assets whenever events or changes in circumstances indicate that the carrying value may not be recoverable and on intangible assets quarterly. Impairment is the condition that exists when the carrying amount of a long-lived asset exceeds its fair value, and any impairment charge that we record reduces our earnings. We review the carrying value of these assets based upon estimated future cash flows while taking into consideration assumptions and estimates including the future use of the asset, remaining useful life of the asset, and service potential of the asset.

Goodwill is the excess of the cost of an acquired entity over the net of the amounts assigned to assets acquired and liabilities assumed. We test goodwill for impairment annually, during the third quarter, or if an event occurs or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount. For purposes of performing the goodwill impairment test our reporting units are the same as our reportable segments, the Completion and Production division and the Drilling and Evaluation division. See Note 1 to the consolidated financial statements for our accounting policies related to long-lived assets and intangible assets, as well as the results of our goodwill impairment test.

Acquisitions-purchase price allocation

We allocate the purchase price of an acquired business to its identifiable assets and liabilities based on estimated fair values. The excess of the purchase price over the amount allocated to the assets and liabilities, if any, is recorded as goodwill. We use all available information to estimate fair values, including quoted market prices, the carrying value of acquired assets, and widely accepted valuation techniques such as discounted cash flows. We engage third-party appraisal firms to assist in fair value determination of inventories, identifiable intangible assets, and any other significant assets or liabilities when appropriate. The judgments made in determining the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact our results of operations. Our acquisitions may also include contingent consideration, or earn-out provisions, which provide for additional consideration to be paid to the seller if certain future conditions are met. These earn-out provisions are estimated and recognized at fair value at the acquisition date based on projected earnings or other financial metrics over specified periods after the acquisition date. These estimates are reviewed during the specified period and adjusted based on actual results.

Pensions

Our pension benefit obligations and expenses are calculated using actuarial models and methods. Two of the more critical assumptions and estimates used in the actuarial calculations are the discount rate for determining the current value of benefit obligations and the expected long-term rate of return on plan assets used in determining net periodic benefit cost. Other critical assumptions and estimates used in determining benefit obligations and cost, including demographic factors such as retirement age, mortality, and turnover, are also evaluated periodically and updated accordingly to reflect our actual experience.

Discount rates are determined annually and are based on the prevailing market rate of a portfolio of high-quality debt instruments with maturities matching the expected timing of the payment of the benefit obligations. Expected long-term rates of return on plan assets are determined annually and are based on an evaluation of our plan assets and historical trends and experience, taking into account current and expected market conditions. Plan assets are comprised primarily of equity and debt.

securities. As we have both domestic and international plans, these assumptions differ based on varying factors specific to each particular country or economic environment.

The discount rate utilized in 2013 to determine the projected benefit obligation at the measurement date for our United Kingdom pension plan, which constituted 81% of our international plans' pension obligations, was 4.5% compared to a discount rate of 4.6% utilized in 2012. The expected long-term rate of return assumption used for our United Kingdom pension plan expense was 6.5% in 2013, compared to 6.7% in 2012.

The following table illustrates the sensitivity to changes in certain assumptions, holding all other assumptions constant, for our United Kingdom pension plan.

<i>Millions of dollars</i>	Effect on	
	Pretax Pension Expense in 2013	Pension Benefit Obligation at December 31, 2013
25-basis-point decrease in discount rate	\$ 1	\$ 55
25-basis-point increase in discount rate	(1)	(51)
25-basis-point decrease in expected long-term rate of return	2	NA
25-basis-point increase in expected long-term rate of return	(2)	NA

Our international defined benefit plans reduced pretax income by \$32 million in 2013, \$26 million in 2012, and \$27 million in 2011. Included in these amounts was income from expected pension returns of \$44 million in 2013, \$45 million in 2012, and \$47 million in 2011. Actual returns on international plan assets totaled \$117 million in 2013, compared to \$87 million in 2012. Our net actuarial loss, net of tax, related to international pension plans was \$222 million at December 31, 2013 and \$208 million at December 31, 2012. In our international plans where employees earn additional benefits for continued service, actuarial gains and losses will be recognized in operating income over a period of three to 17 years, which represents the estimated average remaining service of the participant group expected to receive benefits. In our international plans where benefits are not accrued for continued service, actuarial gains and losses will be recognized in operating income over a period of 17 to 33 years, which represents the estimated average remaining lifetime of the benefit obligations. These ranges reflect varying maturity levels among the plans.

During 2013, we made contributions of \$26 million to fund our international defined benefit plans. We expect to make contributions of approximately \$17 million to our international defined benefit plans in 2014.

The actuarial assumptions used in determining our pension benefit obligations may differ materially from actual results due to changing market and economic conditions, higher or lower withdrawal rates, and longer or shorter life spans of participants. While we believe that the assumptions used are appropriate, differences in actual experience or changes in assumptions may materially affect our financial position or results of operations. See Note 14 to the consolidated financial statements for further information related to defined benefit and other postretirement benefit plans.

Allowance for bad debts

We evaluate our accounts receivable through a continuous process of assessing our portfolio on an individual customer and overall basis. This process consists of a thorough review of historical collection experience, current aging status of the customer accounts, financial condition of our customers, and whether the receivables involve retainages. We also consider the economic environment of our customers, both from a marketplace and geographic perspective, in evaluating the need for an allowance. Based on our review of these factors, we establish or adjust allowances for specific customers and the accounts receivable portfolio as a whole. This process involves a high degree of judgment and estimation, and frequently involves significant dollar amounts. Accordingly, our results of operations can be affected by adjustments to the allowance due to actual write-offs that differ from estimated amounts. Our estimates of allowances for bad debts have historically been accurate. Over the last five years, our estimates of allowances for bad debts as a percentage of notes and accounts receivable before the allowance, have ranged from 1.6% to 3.0%. At December 31, 2013, allowance for bad debts totaled \$117 million, or 1.9% of notes and accounts receivable before the allowance. At December 31, 2012, allowance for bad debts totaled \$92 million, or 1.6% of notes and accounts receivable before the allowance. A hypothetical 100 basis point change in our estimate of the collectability of our notes and accounts receivable balance as of December 31, 2013 would have resulted in a \$62 million adjustment to 2013 total operating costs and expenses. See Note 3 to the consolidated financial statements for further information.

Percentage of completion

Revenue from certain long-term, integrated project management contracts to provide well construction and completion services is reported on the percentage-of-completion method of accounting. Progress is generally based upon physical progress related to contractually defined units of work. At the outset of each contract, we prepare a detailed analysis of our estimated cost to complete the project. Risks related to service delivery, usage, productivity and other factors are considered in the estimation process. The recording of profits and losses on long-term contracts requires an estimate of the total profit or loss over the life of each contract. This estimate requires consideration of total contract value, change orders and claims, less costs incurred and estimated costs to complete. Anticipated losses on contracts are recorded in full in the period in which they become evident. Profits are recorded based upon the total estimated contract profit times the current percentage complete for the contract.

At least quarterly, significant projects are reviewed in detail by senior management. There are many factors that impact future costs, including weather, inflation, labor and community disruptions, timely availability of materials, productivity, and other factors as outlined in Item 1(a), "Risk Factors." These factors can affect the accuracy of our estimates and materially impact our future reported earnings. See Note 1 to the consolidated financial statements for further information.

OFF BALANCE SHEET ARRANGEMENTS

At December 31, 2013, we had no material off balance sheet arrangements, except for operating leases. For information on our contractual obligations related to operating leases, see "Management's Discussion and Analysis of Financial Condition and Results of Operations – Liquidity and Capital Resources – Contractual obligations."

FINANCIAL INSTRUMENT MARKET RISK

We are exposed to market risk from changes in foreign currency exchange rates and interest rates. We selectively manage these exposures through the use of derivative instruments, including forward foreign exchange contracts, foreign exchange options, and interest rate swaps. The objective of our risk management strategy is to minimize the volatility from fluctuations in foreign currency and interest rates. We do not use derivative instruments for trading purposes. The counterparties to our forward contracts, options, and interest rate swaps are global commercial and investment banks.

We use a sensitivity analysis model to measure the impact of a 10% adverse movement of foreign currency exchange rates against the United States dollar. A hypothetical 10% adverse change in the value of all our foreign currency positions relative to the United States dollar as of December 31, 2013 would result in an \$89 million, pre-tax, loss for our net monetary assets denominated in currencies other than United States dollars.

With respect to interest rates sensitivity, after consideration of the impact from the interest rate swaps, a hypothetical 100 basis point increase in the LIBOR rate would result in approximately an additional \$10 million of interest charges for the year ended December 31, 2013.

There are certain limitations inherent in the sensitivity analyses presented, primarily due to the assumption that interest rates and exchange rates change instantaneously in an equally adverse fashion. In addition, the analyses are unable to reflect the complex market reactions that normally would arise from the market shifts modeled. While this is our best estimate of the impact of the various scenarios, these estimates should not be viewed as forecasts.

For further information regarding foreign currency exchange risk, interest rate risk, and credit risk, see Note 13 to the consolidated financial statements.

ENVIRONMENTAL MATTERS

We are subject to numerous environmental, legal, and regulatory requirements related to our operations worldwide. For information related to environmental matters, see Note 8 to the consolidated financial statements and Part I, Item 1(a), "Risk Factors."

FORWARD-LOOKING INFORMATION

The Private Securities Litigation Reform Act of 1995 provides safe harbor provisions for forward-looking information. Forward-looking information is based on projections and estimates, not historical information. Some statements in this Form 10-K are forward-looking and use words like "may," "may not," "believes," "do not believe," "plans," "estimates," "intends," "expects," "do not expect," "anticipates," "do not anticipate," "should," "likely," and other expressions. We may also provide oral or written forward-looking information in other materials we release to the public. Forward-looking information involves risk and uncertainties and reflects our best judgment based on current information. Our results of operations can be affected by inaccurate assumptions we make or by known or unknown risks and uncertainties. In addition, other factors may affect the accuracy of our forward-looking information. As a result, no forward-looking information can be guaranteed. Actual events and results of operations may vary materially.

We do not assume any responsibility to publicly update any of our forward-looking statements regardless of whether factors change as a result of new information, future events, or for any other reason. You should review any additional disclosures we make in our press releases and Forms 10-K, 10-Q, and 8-K filed with or furnished to the SEC. We also suggest that you listen to our quarterly earnings release conference calls with financial analysts.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

The management of Halliburton Company is responsible for establishing and maintaining adequate internal control over financial reporting as defined in the Securities Exchange Act Rule 13a-15(f)

Internal control over financial reporting, no matter how well designed, has inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation. Further, because of changes in conditions, the effectiveness of internal control over financial reporting may vary over time.

Under the supervision and with the participation of our management, including our chief executive officer and chief financial officer, we conducted an evaluation to assess the effectiveness of our internal control over financial reporting as of December 31, 2013 based upon criteria set forth in the Internal Control - Integrated Framework (1992) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on our assessment, we believe that, as of December 31, 2013, our internal control over financial reporting is effective.

The effectiveness of Halliburton's internal control over financial reporting as of December 31, 2013 has been audited by KPMG LLP, an independent registered public accounting firm, as stated in their report that is included herein.

HALLIBURTON COMPANY

by

/s/ David J. Lesar

David J. Lesar
Chairman of the Board,
President, and Chief Executive Officer

/s/ Mark A. McCollum

Mark A. McCollum
Executive Vice President and
Chief Financial Officer

Report of Independent Registered Public Accounting Firm

The Board of Directors and Shareholders
Halliburton Company

We have audited the accompanying consolidated balance sheets of Halliburton Company and subsidiaries as of December 31, 2013 and 2012, and the related consolidated statements of operations, shareholders' equity, comprehensive income, and cash flows for each of the years in the three -year period ended December 31, 2013. These consolidated financial statements are the responsibility of Halliburton Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Halliburton Company and subsidiaries as of December 31, 2013 and 2012, and the results of their operations and their cash flows for each of the years in the three -year period ended December 31, 2013, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Halliburton Company's internal control over financial reporting as of December 31, 2013, based on criteria established in Internal Control - Integrated Framework (1992) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), and our report dated February 7, 2014 expressed an unqualified opinion on the effectiveness of Halliburton Company's internal control over financial reporting.

/s/ KPMG LLP
Houston, Texas
February 7, 2014

Report of Independent Registered Public Accounting Firm

The Board of Directors and Shareholders
Halliburton Company

We have audited Halliburton Company's internal control over financial reporting as of December 31, 2013, based on criteria established in Internal Control - Integrated Framework (1992) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Halliburton Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on Halliburton Company's internal control over financial reporting based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

In our opinion, Halliburton Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2013, based on criteria established in Internal Control - Integrated Framework (1992) issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of Halliburton Company and subsidiaries as of December 31, 2013 and 2012, and the related consolidated statements of operations, shareholders' equity, comprehensive income, and cash flows for each of the years in the three-year period ended December 31, 2013, and our report dated February 7, 2014 expressed an unqualified opinion on those consolidated financial statements.

/s/ KPMG LLP
Houston, Texas
February 7, 2014

HALLIBURTON COMPANY
Consolidated Statements of Operations

<i>Millions of dollars and shares except per share data</i>	Year Ended December 31		
	2013	2012	2011
Revenue:			
Services	\$ 22,257	\$ 22,196	\$ 19,692
Product sales	7,145	6,307	5,137
Total revenue	29,402	28,503	24,829
Operating costs and expenses:			
Cost of services	18,959	18,447	15,432
Cost of sales	5,972	5,322	4,379
Loss contingency for Macondo well incident	1,000	300	—
General and administrative	333	275	281
Total operating costs and expenses	26,264	24,344	20,092
Operating income	3,138	4,159	4,737
Interest expense, net of interest income of \$8, \$7, and \$5	(331)	(298)	(263)
Other, net	(43)	(39)	(25)
Income from continuing operations before income taxes	2,764	3,822	4,449
Provision for income taxes	(648)	(1,235)	(1,439)
Income from continuing operations	2,116	2,587	3,010
Income (loss) from discontinued operations, net of income tax benefit (provision) of \$1, \$82, and \$(18)	19	58	(166)
Net income	\$ 2,135	\$ 2,645	\$ 2,844
Noncontrolling interest in net income of subsidiaries	(10)	(10)	(5)
Net income attributable to company	\$ 2,125	\$ 2,635	\$ 2,839
Amounts attributable to company shareholders:			
Income from continuing operations	\$ 2,106	\$ 2,577	\$ 3,005
Income (loss) from discontinued operations, net	19	58	(166)
Net income attributable to company	\$ 2,125	\$ 2,635	\$ 2,839
Basic income per share attributable to company shareholders:			
Income from continuing operations	\$ 2.35	\$ 2.78	\$ 3.27
Income (loss) from discontinued operations, net	0.02	0.07	(0.18)
Net income per share	\$ 2.37	\$ 2.85	\$ 3.09
Diluted income per share attributable to company shareholders:			
Income from continuing operations	\$ 2.33	\$ 2.78	\$ 3.26
Income (loss) from discontinued operations, net	0.03	0.06	(0.18)
Net income per share	\$ 2.36	\$ 2.84	\$ 3.08
Basic weighted average common shares outstanding	898	926	918
Diluted weighted average common shares outstanding	902	928	922

See notes to consolidated financial statements

HALLIBURTON COMPANY
Consolidated Statements of Comprehensive Income

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Net income	\$ 2,135	\$ 2,645	\$ 2,844
Other comprehensive income, net of income taxes:			
Defined benefit and other postretirement plans adjustments	—	(33)	(34)
Other	2	(3)	—
Other comprehensive income (loss), net of income taxes	2	(36)	(34)
Comprehensive income	\$ 2,137	\$ 2,609	\$ 2,810
Comprehensive income attributable to noncontrolling interest	(10)	(10)	(4)
Comprehensive income attributable to company shareholders	\$ 2,127	\$ 2,599	\$ 2,806

See notes to consolidated financial statements

HALLIBURTON COMPANY
Consolidated Balance Sheets

<i>Millions of dollars and shares except per share data</i>	December 31	
	2013	2012
Assets		
Current assets:		
Cash and equivalents	\$ 2,356	\$ 2,484
Receivables (less allowance for bad debts of \$117 and \$92)	6,181	5,787
Inventories	3,305	3,186
Prepaid expenses	737	608
Current deferred income taxes	388	351
Other current assets	737	670
Total current assets	13,704	13,086
Property, plant, and equipment, net of accumulated depreciation of \$9,480 and \$8,056	11,322	10,257
Goodwill	2,168	2,135
Other assets	2,029	1,932
Total assets	\$ 29,223	\$ 27,410
Liabilities and Shareholders' Equity		
Current liabilities:		
Accounts payable	\$ 2,365	\$ 2,041
Accrued employee compensation and benefits	1,029	930
Deferred revenue	350	307
Loss contingency for Macondo well incident	278	—
Other current liabilities	1,004	1,474
Total current liabilities	5,026	4,752
Long-term debt	7,816	4,820
Loss contingency for Macondo well incident	1,022	300
Employee compensation and benefits	584	607
Other liabilities	1,160	1,141
Total liabilities	15,608	11,620
Shareholders' equity:		
Common shares, par value \$2.50 per share (authorized 2,000 shares, issued 1,072 and 1,073 shares)	2,680	2,682
Paid-in capital in excess of par value	415	486
Accumulated other comprehensive loss	(307)	(309)
Retained earnings	18,842	17,182
Treasury stock, at cost (223 and 144 shares)	(8,049)	(4,276)
Company shareholders' equity	13,581	15,765
Noncontrolling interest in consolidated subsidiaries	34	25
Total shareholders' equity	13,615	15,790
Total liabilities and shareholders' equity	\$ 29,223	\$ 27,410

See notes to consolidated financial statements

HALLIBURTON COMPANY
Consolidated Statements of Cash Flows

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Cash flows from operating activities:			
Net income	\$ 2,135	\$ 2,645	\$ 2,844
Adjustments to reconcile net income to net cash flows from operating activities			
Depreciation, depletion, and amortization	1,900	1,628	1,359
Loss contingency for Macondo well incident	1,000	300	—
Provision (benefit) for deferred income taxes, continuing operations	(132)	165	(30)
(Income) loss from discontinued operations, net	(19)	(58)	166
Other changes			
Receivables	(449)	(682)	(1,218)
Accounts payable	327	200	649
Payment of Banacuda-Caratunga obligation	(219)	—	—
Inventories	(107)	(611)	(564)
Other	11	67	478
Total cash flows from operating activities	4,447	3,654	3,684
Cash flows from investing activities:			
Capital expenditures	(2,934)	(3,566)	(2,953)
Sales of investment securities	356	258	1,001
Purchases of investment securities	(329)	(506)	(501)
Sales of property, plant, and equipment	241	395	160
Acquisitions of business assets, net of cash acquired	(94)	(214)	(880)
Other investing activities	(110)	(55)	(17)
Total cash flows from investing activities	(2,870)	(3,688)	(3,190)
Cash flows from financing activities:			
Payments to reacquire common stock	(4,356)	—	—
Proceeds from long-term borrowings, net of offering costs	2,968	—	978
Dividends to shareholders	(465)	(333)	(330)
Proceeds from exercises of stock options	277	107	160
Other financing activities	(178)	54	25
Total cash flows from financing activities	(1,754)	(172)	833
Effect of exchange rate changes on cash	49	(8)	(27)
Increase (decrease) in cash and equivalents	(128)	(214)	1,300
Cash and equivalents at beginning of year	2,484	2,698	1,398
Cash and equivalents at end of year	\$ 2,356	\$ 2,484	\$ 2,698
Supplemental disclosure of cash flow information:			
Cash payments during the period for:			
Interest	\$ 293	\$ 294	\$ 261
Income taxes	\$ 913	\$ 1,098	\$ 1,285

See notes to consolidated financial statements

HALLIBURTON COMPANY
Consolidated Statements of Shareholders' Equity

<i>Millions of dollars</i>	Company Shareholders' Equity					Noncontrolling interest in Consolidated Subsidiaries	Total
	Common Shares	Paid-in Capital in Excess of Par Value	Treasury Stock	Retained Earnings	Accumulated Other Comprehensive Income (Loss)		
Balance at December 31, 2010	\$ 2,674	\$ 339	\$(4,771)	\$ 12,371	\$(240)	14	\$ 10,387
Comprehensive income (loss):							
Net income	—	—	—	2,839	—	5	2,844
Other comprehensive loss	—	—	—	—	(33)	(1)	(34)
Cash dividends (\$0.36 per share)	—	—	—	(330)	—	—	(330)
Stock plans	9	82	224	—	—	—	315
Other	—	34	—	—	—	—	34
Balance at December 31, 2011	\$ 2,683	\$ 455	\$(4,547)	\$ 14,880	\$(273)	18	\$ 13,216
Comprehensive income (loss):							
Net income	—	—	—	2,635	—	10	2,645
Other comprehensive loss	—	—	—	—	(36)	—	(36)
Cash dividends (\$0.36 per share)	—	—	—	(111)	—	—	(111)
Stock plans	(1)	25	271	—	—	—	295
Other	—	6	—	—	—	(3)	3
Balance at December 31, 2012	\$ 2,682	\$ 486	\$(4,276)	\$ 17,182	\$(109)	25	\$ 15,790
Comprehensive income:							
Net income	—	—	—	2,125	—	10	2,135
Other comprehensive income	—	—	—	—	2	—	2
Common shares repurchased	—	—	(4,356)	—	—	—	(4,356)
Stock plans	(2)	(97)	583	—	—	—	484
Cash dividends (\$0.525 per share)	—	—	—	(465)	—	—	(465)
Other	—	26	—	—	—	(1)	25
Balance at December 31, 2013	\$ 2,680	\$ 415	\$(8,049)	\$ 18,842	\$(307)	34	\$ 13,615

See notes to consolidated financial statements

HALLIBURTON COMPANY
Notes to Consolidated Financial Statements

Note 1. Description of Company and Significant Accounting Policies

Description of Company

Halliburton Company's predecessor was established in 1919 and incorporated under the laws of the State of Delaware in 1924. We are one of the world's largest oilfield services companies. Our two business segments are the Completion and Production segment and the Drilling and Evaluation segment. We provide a comprehensive range of services and products for the exploration, development, and production of oil and natural gas around the world.

Use of estimates

Our financial statements are prepared in conformity with United States generally accepted accounting principles, requiring us to make estimates and assumptions that affect:

- the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements, and
- the reported amounts of revenue and expenses during the reporting period.

We believe the most significant estimates and assumptions are associated with the forecasting of our effective income tax rate and the valuation of deferred taxes, legal and environmental reserves, long-lived asset valuations, purchase price allocations, pensions, allowance for bad debts, and percentage-of-completion accounting for long-term contracts. Ultimate results could differ from our estimates.

Basis of presentation

The consolidated financial statements include the accounts of our company and all of our subsidiaries that we control or variable interest entities for which we have determined that we are the primary beneficiary. All material intercompany accounts and transactions are eliminated. Investments in companies in which we have significant influence are accounted for using the equity method of accounting. If we do not have significant influence, we use the cost method of accounting.

In 2013, we adopted the provisions of a new accounting standard. See Note 15 for further information. All periods presented reflect these changes.

Revenue recognition

Overall. Our services and products are generally sold based upon purchase orders or contracts with our customers that include fixed or determinable prices but do not include right of return provisions or other significant post-delivery obligations. Our products are produced in a standard manufacturing operation, even if produced to our customer's specifications. We recognize revenue from product sales when title passes to the customer, the customer assumes risks and rewards of ownership, collectability is reasonably assured, and delivery occurs as directed by our customer. Service revenue, including training and consulting services, is recognized when the services are rendered and collectability is reasonably assured. Rates for services are typically priced on a per day, per meter, per man-hour, or similar basis.

Software sales. Sales of perpetual software licenses, net of any deferred maintenance and support fees, are recognized as revenue upon shipment. Sales of time-based licenses are recognized as revenue over the license period. Maintenance and support fees are recognized as revenue ratably over the contract period, usually a one-year duration.

Percentage of completion. Revenue from certain long-term, integrated project management contracts to provide well construction and completion services is reported on the percentage-of-completion method of accounting. Progress is generally based upon physical progress related to contractually defined units of work. Physical percent complete is determined as a combination of input and output measures as deemed appropriate by the circumstances. All known or anticipated losses on contracts are provided for when they become evident. Cost adjustments that are in the process of being negotiated with customers for extra work or changes in the scope of work are included in revenue when collection is deemed probable.

Research and development

Research and development costs are expensed as incurred. Research and development costs were \$588 million in 2013, \$460 million in 2012, and \$401 million in 2011.

Cash equivalents

We consider all highly liquid investments with an original maturity of three months or less to be cash equivalents.

Inventories

Inventories are stated at the lower of cost or market. Cost represents invoice or production cost for new items and original cost less allowance for condition for used material returned to stock. Production cost includes material, labor, and manufacturing overhead. Some domestic manufacturing and field service finished products and parts inventories for drill bits, completion products, and bulk materials are recorded using the last-in, first-out method. The remaining inventory is recorded on the average cost method. We regularly review inventory quantities on hand and record provisions for excess or obsolete inventory based primarily on historical usage, estimated product demand, and technological developments.

Allowance for bad debts

We establish an allowance for bad debts through a review of several factors, including historical collection experience, current aging status of the customer accounts and financial condition of our customers. Our policy is to write off bad debts when the customer accounts are determined to be uncollectible.

Property, plant, and equipment

Other than those assets that have been written down to their fair values due to impairment, property, plant, and equipment are reported at cost less accumulated depreciation, which is generally provided on the straight-line method over the estimated useful lives of the assets. Accelerated depreciation methods are used for tax purposes, wherever permitted. Upon sale or retirement of an asset, the related costs and accumulated depreciation are removed from the accounts and any gain or loss is recognized. Planned major maintenance costs are generally expensed as incurred. Expenditures for additions, modifications, and conversions are capitalized when they increase the value or extend the useful life of the asset.

Goodwill and other intangible assets

We record as goodwill the excess purchase price over the fair value of the tangible and identifiable intangible assets acquired. Changes in the carrying amount of goodwill are detailed below by reportable segment.

<i>Millions of dollars</i>	Completion and Production	Drilling and Evaluation	Total
Balance at December 31, 2011	\$ 1,215	\$ 561	\$ 1,776
Current year acquisitions	100	62	162
Purchase price adjustments for previous acquisitions	196	1	197
Balance at December 31, 2012	\$ 1,511	\$ 624	\$ 2,135
Current year acquisitions	43	10	53
Purchase price adjustments for previous acquisitions	(21)	1	(20)
Balance at December 31, 2013	\$ 1,533	\$ 635	\$ 2,168

The reported amounts of goodwill for each reporting unit are reviewed for impairment on an annual basis during the third quarter, and more frequently should negative conditions such as significant current or projected operating losses exist. In 2012 and 2011, we elected to perform a qualitative assessment for our annual goodwill impairment test. If a qualitative assessment indicates that it is more likely than not that the fair value of a reporting unit is less than its carrying amount, then we would be required to perform a quantitative impairment test for goodwill. In 2013, we elected to bypass the qualitative assessment and perform a quantitative impairment test. This two-step process involves comparing the estimated fair value of each reporting unit to the reporting unit's carrying value, including goodwill. If the fair value of a reporting unit exceeds its carrying amount, goodwill of the reporting unit is not considered impaired, and the second step of the impairment test is unnecessary. If the carrying amount of a reporting unit exceeds its fair value, the second step of the goodwill impairment test would be performed to measure the amount of impairment loss to be recorded, if any. Our goodwill impairment assessment for 2013 indicated the fair value of each of our reporting units exceeded its carrying amount by a significant margin. Based on our qualitative assessment of goodwill in 2012 and 2011, we concluded that it was more likely than not that the fair value of each of our reporting units was greater than their carrying amount, and therefore no further testing was required. In addition, there were no triggering events that occurred in 2013, 2012, or 2011 requiring us to perform additional impairment reviews. As such, there were no impairments of goodwill recorded in the three-year period ended December 31, 2013.

We amortize other identifiable intangible assets with a finite life on a straight-line basis over the period which the asset is expected to contribute to our future cash flows, ranging from three to twenty years. The components of these other intangible assets generally consist of patents, license agreements, non-compete agreements, trademarks, and customer lists and contracts.

Evaluating impairment of long-lived assets

When events or changes in circumstances indicate that long-lived assets other than goodwill may be impaired, an evaluation is performed. For an asset classified as held for use, the estimated future undiscounted cash flows associated with the asset are compared to the asset's carrying amount to determine if a write-down to fair value is required. When an asset is classified as held for sale, the asset's book value is evaluated and adjusted to the lower of its carrying amount or fair value less cost to sell. In addition, depreciation and amortization is ceased while it is classified as held for sale.

Income taxes

We recognize the amount of taxes payable or refundable for the year. In addition, deferred tax assets and liabilities are recognized for the expected future tax consequences of events that have been recognized in the financial statements or tax returns. A valuation allowance is provided for deferred tax assets if it is more likely than not that these items will not be realized.

In assessing the realizability of deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers the scheduled reversal of deferred tax liabilities, projected future taxable income, and tax planning strategies in making this assessment. Based upon the level of historical taxable income and projections for future taxable income over the periods in which the deferred tax assets are deductible, management believes it is more likely than not that we will realize the benefits of these deductible differences, net of the existing valuation allowances.

We recognize interest and penalties related to unrecognized tax benefits within the provision for income taxes on continuing operations in our consolidated statements of operations.

We generally do not provide income taxes on the undistributed earnings of non-United States subsidiaries because such earnings are intended to be reinvested indefinitely to finance foreign activities. These additional foreign earnings could be subject to additional tax if remitted, or deemed remitted, as a dividend; however, it is not practicable to estimate the additional amount, if any, of taxes payable. Taxes are provided as necessary with respect to earnings that are not permanently reinvested.

Derivative instruments

At times, we enter into derivative financial transactions to hedge existing or projected exposures to changing foreign currency exchange rates and interest rates. We do not enter into derivative transactions for speculative or trading purposes. We recognize all derivatives on the balance sheet at fair value. Derivatives that are not hedges are adjusted to fair value and reflected through the results of operations. If the derivative is designated as a hedge, depending on the nature of the hedge, changes in the fair value of derivatives are either offset against:

- the change in fair value of the hedged assets, liabilities, or firm commitments through earnings; or
- recognized in other comprehensive income until the hedged item is recognized in earnings.

The ineffective portion of a derivative's change in fair value is recognized in earnings. Recognized gains or losses on derivatives entered into to manage foreign currency exchange risk are included in "Other, net" on the consolidated statements of operations. Gains or losses on interest rate derivatives are included in "Interest expense, net."

Foreign currency translation

Foreign entities whose functional currency is the United States dollar translate monetary assets and liabilities at year-end exchange rates, and nonmonetary items are translated at historical rates. Income and expense accounts are translated at the average rates in effect during the year, except for depreciation, cost of product sales and revenue, and expenses associated with nonmonetary balance sheet accounts, which are translated at historical rates. Gains or losses from changes in exchange rates are recognized in our consolidated statements of operations in "Other, net" in the year of occurrence.

Stock-based compensation

Stock-based compensation cost is measured at the date of grant, based on the calculated fair value of the award, and is recognized as expense over the employee's service period, which is generally the vesting period of the equity grant. Additionally, compensation cost is recognized based on awards ultimately expected to vest; therefore, we have reduced the cost for estimated forfeitures based on historical forfeiture rates. Forfeitures are estimated at the time of grant and revised in subsequent periods to reflect actual forfeitures. See Note 11 for additional information related to stock-based compensation.

Note 2. Business Segment and Geographic Information

We operate under two divisions, which form the basis for the two operating segments we report: the Completion and Production segment and the Drilling and Evaluation segment.

Completion and Production delivers cementing, stimulation, intervention, pressure control, specialty chemicals, artificial lift, and completion services. The segment consists of Production Enhancement, Cementing, Completion Tools, Halliburton Boots & Coots, Multi-Chem, and Halliburton Artificial Lift.

Production Enhancement services include stimulation services and sand control services. Stimulation services optimize oil and natural gas reservoir production through a variety of pressure pumping services, nitrogen services, and chemical processes, commonly known as hydraulic fracturing and acidizing. Sand control services include fluid and chemical systems and pumping services for the prevention of formation sand production.

Cementing services involve bonding the well and well casing while isolating fluid zones and maximizing wellbore stability. Our cementing service line also provides casing equipment.

Completion Tools provides downhole solutions and services to our customers to complete their wells, including well completion products and services, intelligent well completions, liner hanger systems, sand control systems, and service tools.

Halliburton Boots & Coots includes well intervention services, pressure control, equipment rental tools and services, and pipeline and process services.

Multi-Chem includes oilfield production and completion chemicals and services that address production, processing, and transportation challenges.

Halliburton Artificial Lift offers electrical submersible pumps, including the associated surface package for power, control, and monitoring of the entire lift system, and provides installation, maintenance, repair, and testing services. The objective of these services is to maximize reservoir and wellbore recovery by applying lifting technology and intelligent field management solutions throughout the life of the well.

Drilling and Evaluation provides field and reservoir modeling, drilling, evaluation, and precise wellbore placement solutions that enable customers to model, measure, drill, and optimize their well construction activities. The segment consists of Drill Bits and Services, Wireline and Perforating, Testing and Subsea, Baroid, Sperry Drilling, Landmark Software and Services, and Consulting and Project Management.

Drill Bits and Services provides roller cone rock bits, fixed cutter bits, hole enlargement, and related downhole tools and services used in drilling oil and natural gas wells. In addition, coring equipment and services are provided to acquire cores of the formation drilled for evaluation.

Wireline and Perforating services include open-hole logging services that provide information on formation evaluation and reservoir fluid analysis, including formation lithology, rock properties, and reservoir fluid properties. Also offered are cased-hole and slickline services, which provide perforating, pipe recovery services, through-casing formation evaluation and reservoir monitoring, casing and cement integrity measurements, and well intervention services. Borehole seismic services include downhole seismic operations, check-shots and vertical seismic profiles, and provide the link between surface seismic and the wellbore. Finally, formation and reservoir solutions transform formation evaluation data into reservoir insight through geoscience solutions.

Testing and Subsea services provide acquisition and analysis of dynamic reservoir information and reservoir optimization solutions to the oil and natural gas industry through a broad portfolio of test tools, data acquisition services, fluid sampling, surface well testing, and subsea safety systems.

Baroid provides drilling fluid systems, performance additives, completion fluids, solids control, specialized testing equipment, and waste management services for oil and natural gas drilling, completion, and workover operations.

Sperry Drilling provides drilling systems and services. These services include directional and horizontal drilling, measurement-while-drilling, logging-while-drilling, surface data logging, multilateral systems, underbalanced applications, and rig site information systems. Our drilling systems offer directional control for precise wellbore placement while providing important measurements about the characteristics of the drill string and geological formations while drilling wells. Real-time operating capabilities enable the monitoring of well progress and aid decision-making processes.

Landmark Software and Services is a supplier of integrated exploration, drilling and production software, and related professional and data management services for the upstream oil and natural gas industry.

Consulting and Project Management provides oilfield project management and integrated solutions to independent, integrated, and national oil companies. These offerings make use of all of our oilfield services, products, technologies, and project management capabilities to assist our customers in optimizing the value of their oil and natural gas assets.

Corporate and other includes expenses related to support functions and corporate executives and is primarily composed of cash and equivalents, deferred tax assets, and investment securities. Also included are certain gains, losses and costs not attributable to a particular business segment (such as the loss contingencies related to the Macondo well incident recorded during the first quarters of 2013 and 2012 and the \$55 million charitable contribution expensed during the second quarter of 2013).

Intersegment revenue and revenue between geographic areas are immaterial. Our equity in earnings and losses of unconsolidated affiliates that are accounted for under the equity method of accounting is included in revenue and operating income of the applicable segment. The following tables present information on our business segments.

Operations by business segment

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Revenue:			
Completion and Production	\$ 17,506	\$ 17,380	\$ 15,143
Drilling and Evaluation	11,896	11,123	9,686
Total revenue	\$ 29,402	\$ 28,503	\$ 24,829
Operating income:			
Completion and Production	\$ 2,875	\$ 3,144	\$ 3,733
Drilling and Evaluation	1,770	1,675	1,403
Total operations	4,645	4,819	5,136
Corporate and other	(1,507)	(660)	(399)
Total operating income	\$ 3,138	\$ 4,159	\$ 4,737
Interest expense, net of interest income	\$ (331)	\$ (298)	\$ (263)
Other, net	(43)	(39)	(25)
Income from continuing operations before income taxes	\$ 2,764	\$ 3,822	\$ 4,449
Capital expenditures:			
Completion and Production	\$ 1,676	\$ 2,177	\$ 1,669
Drilling and Evaluation	1,210	1,318	1,231
Corporate and other	48	71	53
Total	\$ 2,934	\$ 3,566	\$ 2,953
Depreciation, depletion, and amortization:			
Completion and Production	\$ 1,013	\$ 843	\$ 680
Drilling and Evaluation	873	783	676
Corporate and other	14	2	3
Total	\$ 1,900	\$ 1,628	\$ 1,359

<i>Millions of dollars</i>	December 31	
	2013	2012
Total assets:		
Completion and Production	\$ 14,203	\$ 13,313
Drilling and Evaluation	10,010	9,290
Shared assets	1,351	1,376
Corporate and other	3,659	3,431
Total	\$ 29,223	\$ 27,410

Not all assets are associated with specific segments. Those assets specific to segments include receivables, inventories, certain identified property, plant, and equipment (including field service equipment), equity in and advances to related companies, and goodwill. The remaining assets, such as cash and equivalents, are considered to be shared among the segments.

Revenue by country is determined based on the location of services provided and products sold

Operations by geographic area

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Revenue:			
United States	\$ 14,311	\$ 15,057	\$ 13,548
Other countries	15,091	13,446	11,281
Total	\$ 29,402	\$ 28,503	\$ 24,829

<i>Millions of dollars</i>	December 31	
	2013	2012
Net property, plant, and equipment:		
United States	\$ 5,368	\$ 5,096
Other countries	5,954	5,161
Total	\$ 11,322	\$ 10,257

Note 3. Receivables

Our trade receivables are generally not collateralized. At December 31, 2013 and December 31, 2012, 34% and 36% of our gross trade receivables were from customers in the United States. No other country or single customer accounted for more than 10% of our gross trade receivables at these dates.

We continue to experience delays in collecting payment on our receivables from our primary customer in Venezuela. These receivables are not disputed, and we have not historically had material write-offs relating to this customer. Our total outstanding trade receivables in Venezuela were \$486 million, or approximately 8% of our gross trade receivables, as of December 31, 2013, compared to \$491 million, or approximately 9% of our gross trade receivables, as of December 31, 2012. Of the \$486 million receivables in Venezuela as of December 31, 2013, \$183 million has been classified as long-term and included within "Other assets" on our consolidated balance sheets. Of the \$491 million receivables in Venezuela as of December 31, 2012, \$143 million has been classified as long-term and included within "Other assets" on our consolidated balance sheets.

The following table presents a rollforward of our allowance for bad debts for 2011, 2012, and 2013.

<i>Millions of dollars</i>	Balance at Beginning of Period	Charged to Costs and Expenses	Write-Offs	Balance at End of Period
Year ended December 31, 2011	\$ 91	\$ 53	\$ (7)	\$ 137
Year ended December 31, 2012	137	(40)	(5)	92
Year ended December 31, 2013	92	39	(14)	117

Note 4. Inventories

Inventories are stated at the lower of cost or market. In the United States, we manufacture certain finished products and parts inventories for drill bits, completion products, bulk materials, and other tools that are recorded using the last-in, first-out method and totaled \$157 million at December 31, 2013 and \$139 million at December 31, 2012. If the average cost method had been used, total inventories would have been \$35 million higher than reported at December 31, 2013 and \$41 million higher than reported at December 31, 2012. The cost of the remaining inventory was recorded on the average cost method. Inventories consisted of the following:

<i>Millions of dollars</i>	December 31	
	2013	2012
Finished products and parts	\$ 2,445	\$ 2,264
Raw materials and supplies	720	793
Work in process	140	129
Total	\$ 3,305	\$ 3,186

Finished products and parts are reported net of obsolescence reserves of \$130 million at December 31, 2013 and \$114 million at December 31, 2012.

Note 5. Property, Plant, and Equipment

Property, plant, and equipment were composed of the following

<i>Millions of dollars</i>	December 31	
	2013	2012
Land	\$ 213	\$ 145
Buildings and property improvements	2,685	1,861
Machinery, equipment, and other	17,904	16,307
Total	20,802	18,313
Less accumulated depreciation	9,480	8,056
Net property, plant, and equipment	\$ 11,322	\$ 10,257

Classes of assets, excluding oil and natural gas investments, are depreciated over the following useful lives:

	Buildings and Property Improvements	
	2013	2012
1 - 10 years	13%	14%
11 - 20 years	43%	46%
21 - 30 years	20%	14%
31 - 40 years	24%	26%

	Machinery, Equipment, and Other	
	2013	2012
1 - 5 years	22%	20%
6 - 10 years	72%	74%
11 - 20 years	6%	6%

Note 6. Debt

Long-term debt consisted of the following

<i>Millions of dollars</i>	December 31	
	2013	2012
3.5% senior notes due August 2023	\$ 1,098	\$ —
6.15% senior notes due September 2019	997	997
7.45% senior notes due September 2039	995	995
4.75% senior notes due August 2043	898	—
6.7% senior notes due September 2038	800	800
1.0% senior notes due August 2016	600	—
3.25% senior notes due November 2021	498	498
4.5% senior notes due November 2041	498	498
2.0% senior notes due August 2018	400	—
5.9% senior notes due September 2018	400	400
7.6% senior debentures due August 2096	293	293
8.75% senior debentures due February 2021	184	184
Other	155	155
Total long-term debt	\$ 7,816	\$ 4,820

Senior debt

All of our senior notes and debentures rank equally with our existing and future senior unsecured indebtedness, have semiannual interest payments, and have no sinking fund requirements. We may redeem all of our senior notes from time to time or all of the notes of each series at any time at the applicable redemption prices, plus accrued and unpaid interest. Our 7.6% and 8.75% senior debentures may not be redeemed prior to maturity.

Revolving credit facilities

We have an unsecured \$3.0 billion revolving credit facility expiring in 2018. The purpose of the facility is to provide general working capital and credit for other corporate purposes. The full amount of the revolving credit facility was available as of December 31, 2013.

Debt maturities

Our long-term debt matures as follows: \$600 million in 2016, \$45 million in 2017, \$800 million in 2018, and the remainder in 2019 and thereafter.

Note 7. KBR Separation

During 2007, we completed the separation of KBR, Inc. (KBR) from us by exchanging KBR common stock owned by us for our common stock. We entered into various agreements relating to the separation of KBR, including, among others, a Master Separation Agreement (MSA) and a Tax Sharing Agreement (TSA). We recorded a liability at that time reflecting the estimated fair value of the indemnities provided to KBR. Since the separation, we have recorded adjustments to reflect changes to our estimation of our remaining obligation. All such adjustments are recorded in "Income (loss) from discontinued operations, net of income tax (provision) benefit." Amounts accrued relating to our KBR indemnity obligations were included in "Other liabilities" in our consolidated balance sheets and totaled \$219 million as of December 31, 2012. In 2013, we paid \$219 million to satisfy our obligation under a guarantee related to the Barracuda-Caratinga matter, a legacy KBR project. Accordingly, there were no amounts accrued for indemnities provided to KBR at December 31, 2013.

Tax sharing agreement

The TSA provides for the calculation and allocation of United States and certain other jurisdiction tax liabilities between KBR and us for the periods 2001 through the date of separation. The TSA is complex, and finalization of amounts owed between KBR and us under the TSA can occur only after income tax audits are completed by the taxing authorities and both parties have had time to analyze the results.

During the second quarter of 2012, we sent a notice under the TSA to KBR requesting the appointment of an arbitrator in accordance with the terms of the TSA. This request asked the arbitrator to find that KBR owed us a certain amount pursuant to the TSA. KBR denied that it owed us any amount and asserted instead that we owed KBR a certain amount under the TSA. KBR also asserted that it believes the MSA controls its defenses to our TSA claim and demanded arbitration of those defenses under the MSA. In July 2012, we filed suit in the District Court of Harris County, Texas, seeking to compel KBR to arbitrate the entire dispute in accordance with the provisions of the TSA, rather than the MSA. KBR filed a cross-motion seeking to compel arbitration of its defenses under the MSA. In September 2012, the court denied our motion and granted KBR's motion to compel arbitration under the MSA. We continue to believe that the TSA was intended to govern the entire matter and have appealed. The appeal is pending.

In May 2013, KBR's defenses were arbitrated before a panel appointed pursuant to the MSA. In June 2013, the panel issued its decision, finding it had jurisdiction to hear the dispute and that a portion of our claims made under the TSA were barred by the time limitation provision in the MSA. In September 2013, we filed a motion and an application to vacate the panel's decision with the District Court of Harris County, Texas. The court has not ruled on the motion or application.

The MSA panel also ordered the parties to return to the TSA arbitrator for determination of the parties' remaining claims under the TSA. On October 9, 2013, the TSA arbitrator issued a report regarding the claims made by each party. The report found that KBR owes us a net amount of approximately \$105 million, plus interest, with each party bearing its own costs related to the matter.

On October 21, 2013, KBR submitted a request for clarification and reconsideration of the TSA arbitrator's report. In December 2013, the TSA arbitrator issued a supplemental report that reaffirmed the award.

In January 2014, KBR filed a motion with the MSA panel to enforce the panel's June 2013 decision. KBR's motion claimed, among other things, that certain of our claims submitted to the TSA arbitrator were time-barred under the MSA and that the TSA arbitrator misinterpreted the TSA. On February 3, 2014, we filed a response to KBR's motion and an application to confirm the TSA arbitrator's award with the District Court of Harris County, Texas. Due to the uncertainty surrounding the ultimate determination of the parties' claims under the TSA, no material anticipated recovery amounts or liabilities related to this matter have been recognized in the consolidated financial statements as of December 31, 2013.

Note 8. Commitments and Contingencies

Macondo well incident

Overview The semisubmersible drilling rig Deepwater Horizon, sank on April 22, 2010 after an explosion and fire onboard the rig that began on April 20, 2010. The Deepwater Horizon was owned by Transocean Ltd. and had been drilling the Macondo exploration well in Mississippi Canyon Block 252 in the Gulf of Mexico for the lease operator BP Exploration & Production, Inc. (BP Exploration), an indirect wholly owned subsidiary of BP plc. We performed a variety of services for BP Exploration, including cementing, mud logging, directional drilling, measurement-while-drilling, and rig data acquisition services. Crude oil flowing from the well site spread across thousands of square miles of the Gulf of Mexico and reached the United States Gulf Coast. Efforts to contain the flow of hydrocarbons from the well were led by the United States government and by BP plc, BP Exploration, and their affiliates (collectively, BP). There were eleven fatalities and a number of injuries as a result of the Macondo well incident.

We are currently unable to fully estimate the impact the Macondo well incident will have on us. The multi-district litigation (MDL) proceeding referred to below is ongoing. We cannot predict the outcome of the many lawsuits and investigations relating to the Macondo well incident, including orders and rulings of the court that impact the MDL, the results of the MDL trial, the effect that the settlements between BP and the Plaintiffs' Steering Committee (PSC) in the MDL and other settlements may have on claims against us, or whether we might settle with one or more of the parties to any lawsuit or investigation. The first two phases of the MDL trial have concluded, and the MDL court could begin issuing rulings at any time. A determination that the performance of our services on the Deepwater Horizon constituted gross negligence could result in substantial liability to the numerous plaintiffs for punitive damages and potentially to BP with respect to its direct claims against us.

As of December 31, 2013, our loss contingency reserve for the Macondo well incident, relating to the MDL, remained at \$1.3 billion, consisting of a current portion of \$278 million and a non-current portion of \$1.0 billion. This reserve represents a loss contingency that is probable and for which a reasonable estimate of a loss can be made, although we continue to believe that we have substantial legal arguments and defenses against any liability and that BP's indemnity obligation protects us as described below. This loss contingency reserve does not include potential recoveries from our insurers.

We have participated in intermittent discussions with the PSC regarding the potential for a settlement that would resolve a substantial portion of the claims pending in the MDL trial. BP, however, has not participated in any recent settlement discussions with us. Reaching a settlement involves a complex process, and there can be no assurance as to whether or when we may complete a settlement. In addition, the settlement discussions we have had to date do not cover all parties and claims relating to the Macondo well incident. Accordingly, there are additional loss contingencies relating to the Macondo well incident that are reasonably possible but for which we cannot make a reasonable estimate. Given the numerous potential developments relating to the MDL and other lawsuits and investigations, which could occur at any time, we may adjust our estimated loss contingency reserve in the future. Liabilities arising out of the Macondo well incident could have a material adverse effect on our liquidity, consolidated results of operations, and consolidated financial condition.

Investigations and Regulatory Action Several regulatory agencies and others, including the specially constituted National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling (National Commission), conducted investigations of the Macondo well incident, and reports issued as a result of those investigations have been critical of BP, Transocean, and us, among others. For example, one or more of those reports have concluded that primary cement failure was a direct cause of the blowout, that cement testing performed by an independent laboratory "strongly suggests" that the foam cement slurry used on the Macondo well was unstable, and that numerous other oversights and factors caused or contributed to the cause of the incident, including BP's failure to run a cement bond log, BP's and Transocean's failure to properly conduct and interpret a negative-pressure test, the failure of the drilling crew and our surface data logging specialist to recognize that an unplanned influx of oil, natural gas, or fluid into the well was occurring, communication failures among BP, Transocean, and us, and flawed decisions relating to the design, construction, and testing of barriers critical to the temporary abandonment of the well. The U.S. Chemical Safety and Hazard Investigation Board is also conducting an investigation of the incident.

In October 2011, the Bureau of Safety and Environmental Enforcement (BSEE) issued a notification of Incidents of Noncompliance (INCs) to us for allegedly violating federal regulations relating to the failure to take measures to prevent the unauthorized release of hydrocarbons, the failure to take precautions to keep the Macondo well under control, the failure to cement the well in a manner that would, among other things, prevent the release of fluids into the Gulf of Mexico, and the failure to protect health, safety, property, and the environment as a result of a failure to perform operations in a safe and workmanlike manner. According to the BSEE's notice, we did not ensure an adequate barrier to hydrocarbon flow after cementing the production casing and did not detect the influx of hydrocarbons until they were above the blowout preventer stack. We understand that the regulations in effect at the time of the alleged violations provide for fines of up to \$35,000 per day per violation. We have appealed the INCs to the Interior Board of Land Appeals (IBLA). In January 2012, the IBLA, in response to our and the BSEE's joint request, suspended the appeal pending certain proceedings in the MDL trial. Once the MDL court issues a final decision in the trial, we expect to file a proposal for further action in the appeal within

60 days. The BSEE has announced that the INCs will be reviewed for possible imposition of civil penalties once the appeal has ended. The BSEE has stated that this is the first time the Department of the Interior has issued INCs directly to a contractor that was not the well's operator.

The Cementing Job and Reaction to Reports. We disagree with the reports referred to above regarding many of their findings and characterizations with respect to our cementing and surface data logging services, as applicable, on the Deepwater Horizon. We have provided information to the National Commission, its staff, and representatives of other investigatory bodies that we believe has been overlooked or omitted from their reports, as applicable. We intend to continue to vigorously defend ourselves in any investigation relating to our involvement with the Macondo well that we believe inaccurately evaluates or depicts our services on the Deepwater Horizon.

The cement slurry on the Deepwater Horizon was designed and prepared pursuant to well condition data provided by BP. Regardless of whether alleged weaknesses in cement design and testing are or are not ultimately established, and regardless of whether the cement slurry was utilized in similar applications or was prepared consistent with industry standards, we believe that had BP and Transocean properly interpreted a negative-pressure test, this test would have revealed any problems with the cement. In addition, had BP designed the Macondo well to allow a full cement bond log test or if BP had conducted even a partial cement bond log test, the test likely would have revealed any problems with the cement. BP, however, elected not to conduct any cement bond log tests and with Transocean misinterpreted the negative-pressure test, both of which could have resulted in remedial action, if appropriate, with respect to the cementing services. Also, we believe that BP knew or should have known about a critical, additional hydrocarbon zone in the well that BP failed to disclose to us prior to the design of the cement program for the Macondo well.

At this time we cannot predict the impact of the investigations or reports referred to above, or the conclusions or impact of future investigations or reports. We also cannot predict whether any investigations or reports will have an influence on or result in us being named as a party in any action alleging liability or violation of a statute or regulation. We intend to continue to cooperate fully with all hearings, investigations, and requests for information relating to the Macondo well incident. We cannot predict the outcome of, or the costs to be incurred in connection with, any of these hearings or investigations, and therefore we cannot predict the potential impact they may have on us.

DOJ Investigations and Actions. On June 1, 2010, the United States Attorney General announced that the United States Department of Justice (DOJ) was launching civil and criminal investigations into the Macondo well incident to closely examine the actions of those involved, and that the DOJ was working with attorneys general of states affected by the Macondo well incident. The DOJ announced that it was reviewing, among other traditional criminal statutes, possible violations of and liabilities under The Clean Water Act (CWA), The Oil Pollution Act of 1990 (OPA), and the Endangered Species Act of 1973 (ESA).

The CWA provides authority for civil penalties for discharges of oil into or upon navigable waters of the United States, adjoining shorelines, or in connection with the Outer Continental Shelf Lands Act (OCSLA) in quantities that are deemed harmful. A single discharge event may result in the assertion of numerous violations under the CWA. Civil proceedings under the CWA can be commenced against an "owner, operator, or person in charge of any vessel, onshore facility, or offshore facility from which oil or a hazardous substance is discharged" in violation of the CWA. The civil penalties that can be imposed against responsible parties range from up to \$1,100 per barrel of oil discharged in the case of those found strictly liable to \$4,300 per barrel of oil discharged in the case of those found to have been grossly negligent.

The OPA establishes liability for discharges of oil from vessels, onshore facilities, and offshore facilities into or upon the navigable waters of the United States. Under the OPA, the "responsible party" for the discharging vessel or facility is liable for removal and response costs as well as for damages, including recovery costs to contain and remove discharged oil and damages for injury to natural resources and real or personal property, lost revenues, lost profits, and lost earning capacity. The cap on liability under the OPA is the full cost of removal of the discharged oil plus up to \$75 million for damages, except that the \$75 million cap does not apply in the event the damage was proximately caused by gross negligence or the violation of certain federal safety, construction or operating standards. The OPA defines the set of responsible parties differently depending on whether the source of the discharge is a vessel or an offshore facility. Liability for vessels is imposed on owners and operators, liability for offshore facilities is imposed on the holder of the permit or lessee of the area in which the facility is located.

The ESA establishes liability for injury and death to wildlife. The ESA provides for civil penalties for knowing violations that can range up to \$25,000 per violation.

On December 15, 2010, the DOJ filed a civil action seeking damages and injunctive relief against BP Exploration Anadarko Petroleum Corporation and Anadarko E&P Company LP (together, Anadarko), which had an approximate 25% interest in the Macondo well, certain subsidiaries of Transocean Ltd., and others for violations of the CWA and the OPA. The DOJ's complaint seeks an action declaring that the defendants are strictly liable under the CWA as a result of harmful discharges of oil into the Gulf of Mexico and upon United States shorelines as a result of the Macondo well incident. The complaint also seeks an action declaring that the defendants are strictly liable under the OPA for the discharge of oil that has resulted in, among other things, injury to, loss of, loss of use of, or destruction of natural resources and resource services in and around the Gulf of Mexico and the adjoining United States shorelines and resulting in removal costs and damages to the United States far exceeding \$75 million. BP Exploration has been designated, and has accepted the designation, as a responsible party for the pollution under the CWA and the OPA. Others have also been named as responsible parties, and all responsible parties may be held jointly and severally liable for any damages under the OPA. A responsible party may make a claim for contribution against any other responsible party or against third parties it alleges contributed to or caused the oil spill. In connection with the proceedings discussed below under "Litigation," in April 2011 BP Exploration filed a claim against us for equitable contribution with respect to liabilities incurred by BP Exploration under the OPA or another law, which subsequent court filings have indicated may include the CWA, and requested a judgment that the DOJ assert its claims for OPA financial liability directly against us. We filed a motion to dismiss BP Exploration's claim, and that motion is pending. In July 2013, we also filed a motion for summary judgment requesting a court order that we are not liable to BP or Transocean for equitable indemnification or contribution with regard to any CWA fines and penalties that have been assessed or may be assessed against BP or Transocean. That motion is also pending.

We were not named as a responsible party under the CWA or the OPA in the DOJ civil action, and we do not believe we are a responsible party under the CWA or the OPA. While we were not included in the DOJ's civil complaint, there can be no assurance that federal governmental authorities will not bring a civil action against us under the CWA, the OPA, and/or other statutes or regulations.

In July 2013, we reached an agreement with the DOJ to conclude the federal government's criminal investigation of us in relation to the Macondo well incident. Pursuant to a cooperation guilty plea agreement, Halliburton Energy Services, Inc., our wholly owned subsidiary (HESI) agreed to plead guilty to one misdemeanor violation of federal law concerning the deletion of certain computer files created after the occurrence of the Macondo well incident. Pursuant to the plea agreement, HESI agreed to pay a criminal fine of \$0.2 million within five days of sentencing and agreed to three years' probation. The DOJ has agreed that it will not pursue further criminal prosecution of us (including our subsidiaries) for any conduct relating to or arising out of the Macondo well incident. We have agreed to continue to cooperate with the DOJ in any ongoing investigation related to or arising from the incident. In September 2013, our guilty plea was entered and approved by a federal district court judge on the terms and conditions of the plea agreement, and the DOJ closed its criminal investigation of us in relation to the Macondo well incident.

In November 2012, BP announced that it reached an agreement with the DOJ to resolve all federal criminal charges against it stemming from the Macondo well incident. BP agreed to plead guilty to 14 criminal charges, with 13 of those charges based on the negligent misinterpretation of the negative-pressure test conducted on the Deepwater Horizon. BP also agreed to pay \$4.0 billion, including approximately \$1.3 billion in criminal fines, to take actions to further enhance the safety of drilling operations in the Gulf of Mexico, to a term of five years' probation, and to the appointment of two monitors with four-year terms, one relating to process safety and risk management procedures concerning deepwater drilling in the Gulf of Mexico and one relating to the improvement, implementation, and enforcement of BP's code of conduct.

In January 2013, Transocean announced that it reached an agreement with the DOJ to resolve certain claims for civil penalties and potential criminal claims against it arising from the Macondo well incident. Transocean agreed to plead guilty to one misdemeanor violation of the CWA for negligent discharge of oil into the Gulf of Mexico, to pay \$1.0 billion in CWA penalties and \$400 million in fines and recoveries, to implement certain measures to prevent a recurrence of an uncontrolled discharge of hydrocarbons, and to a term of five years' probation.

Litigation. Since April 21, 2010, plaintiffs have been filing lawsuits relating to the Macondo well incident. Generally, those lawsuits allege either (1) damages arising from the oil spill pollution and contamination (e.g., diminution of property value, lost tax revenue, lost business revenue, lost tourist dollars, inability to engage in recreational or commercial activities) or (2) wrongful death or personal injuries. We are named along with other unaffiliated defendants in more than 1,800 complaints, most of which are alleged class actions, involving pollution damage claims and at least eight personal injury lawsuits involving four decedents and at least 10 allegedly injured persons who were on the drilling rig at the time of the incident. At least six additional lawsuits naming us and others relate to alleged personal injuries sustained by those responding to the explosion and oil spill.

The pollution complaints generally allege, among other things, negligence and gross negligence, property damages, taking of protected species, and potential economic losses as a result of environmental pollution, and generally seek awards of unspecified economic, compensatory, and punitive damages, as well as injunctive relief. Plaintiffs in these pollution cases have brought suit under various legal provisions, including the OPA, the CWA, the Migratory Bird Treaty Act of 1918, the ESA, the OCSLA, the Longshoremen and Harbor Workers Compensation Act, general maritime law, state common law, and various state

environmental and products liability statutes. Furthermore, the pollution complaints include suits brought against us by governmental entities, including all of the coastal states of the Gulf of Mexico, numerous local governmental entities, the Mexican State of Yucatan, and the United Mexican States.

The wrongful death and other personal injury complaints generally allege negligence and gross negligence and seek awards of compensatory damages, including unspecified economic damages, and punitive damages. We have retained counsel and are investigating and evaluating the claims, the theories of recovery, damages asserted, and our respective defenses to all of these claims.

Plaintiffs originally filed the lawsuits described above in federal and state courts throughout the United States. Except for a relatively small number of lawsuits not yet consolidated, the Judicial Panel on Multi-District Litigation ordered all of the lawsuits against us consolidated in the MDL proceeding before Judge Carl Barbier in the United States Eastern District of Louisiana.

Judge Barbier is also presiding over a separate proceeding filed by Transocean under the Limitation of Liability Act (Limitation Action). In the Limitation Action, Transocean seeks to limit its liability for claims arising out of the Macondo well incident to the value of the rig and its freight. While the Limitation Action has been formally consolidated into the MDL, the court is nonetheless, in some respects, treating the Limitation Action as an associated but separate proceeding. In February 2011, Transocean tendered us, along with all other defendants, into the Limitation Action. As a result of the tender, we and all other defendants are being treated as direct defendants to the plaintiffs' claims as if the plaintiffs had sued us and the other defendants directly. In the Limitation Action, the judge intends to determine the allocation of liability among all defendants in the hundreds of lawsuits associated with the Macondo well incident, including those in the MDL proceeding that are pending in his court. Specifically, the judge intends to determine the liability, limitation, exoneration and fault allocation with regard to all of the defendants in a trial, which to date has occurred in two phases. We do not believe that a single determination of liability in the Limitation Action is properly applied, particularly with respect to gross negligence and punitive damages, to the hundreds of lawsuits pending in the MDL proceeding.

The defendants in the proceedings described above have filed numerous cross claims and third party claims against certain other defendants. Claims against us seek subrogation, contribution, indemnification, including with respect to liabilities under the OPA, and direct damages, and allege negligence, gross negligence, fraudulent conduct, willful misconduct, fraudulent concealment, comparative fault, and breach of warranty of workmanlike performance. Additional civil lawsuits may be filed against us. In addition to the claims against us, generally the defendants in the proceedings described above, including us, filed claims, including for liabilities under the OPA and other claims similar to those described above, against the other defendants. Our claims against the other defendants seek contribution and indemnification, and allege negligence, gross negligence and willful misconduct. Several of the parties have settled claims among themselves, and claims against some parties have been dismissed. We have also filed an answer to Transocean's Limitation petition denying Transocean's right to limit its liability, denying all claims and responsibility for the incident, seeking contribution and indemnification, and alleging negligence and gross negligence.

Judge Barbier has issued an order, among others, clarifying certain aspects of law applicable to the lawsuits pending in his court. The court ruled that (1) general maritime law will apply, and therefore all claims brought under state law causes of action were dismissed, (2) general maritime law claims may be brought directly against defendants who are non-"responsible parties" under the OPA with the exception of pure economic loss claims by plaintiffs other than commercial fishermen, (3) all claims for damages, including pure economic loss claims, may be brought under the OPA directly against responsible parties, and (4) punitive damage claims can be brought against both responsible and non-responsible parties under general maritime law. As discussed above, with respect to the ruling that claims for damages may be brought under the OPA against responsible parties, we have not been named as a responsible party under the OPA, but BP Exploration has filed a claim against us for contribution with respect to liabilities incurred by BP Exploration under the OPA. The rulings in the court's order remain subject to each applicable party's right to appeal. Certain parishes in Louisiana are currently appealing the dismissal of their state law claims under the order.

In April 2012, BP announced that it had reached definitive settlement agreements with the PSC to resolve the substantial majority of eligible private economic loss and medical claims stemming from the Macondo well incident. The PSC acts on behalf of individuals and business plaintiffs in the MDL. According to BP, the settlements do not include claims against BP made by the DOJ or other federal agencies or by states and local governments. In addition, the settlements provide that, to the extent permitted by law, BP will assign to the settlement class certain of its claims, rights, and recoveries against Transocean and us for damages, including BP's alleged direct damages such as damages for clean-up expenses and damage to the well and reservoir. We do not believe that our contract with BP Exploration permits the assignment of certain claims to the settlement class without our consent. The MDL court has since confirmed certification of the classes for both settlements and granted final approval of the settlements. We objected to the settlements on the grounds set forth above, among other reasons. The MDL court held, however, that we, as a non-settling defendant, lacked standing to object to the settlements but noted that it did not express any opinion as to the validity of BP's assignment of certain claims to the settlement class and that the settlements do not affect any of our procedural or substantive rights in the MDL. BP has been challenging certain provisions of its settlement of economic loss claims in the MDL court and before the United States Fifth Circuit Court of Appeals. We are unable to predict at

this time the effect that the settlements, or any challenge, modification, or overturning of the settlements may have on claims against us.

The MDL court has dismissed (1) claims by or on behalf of owners, lessors, and lessees of real property that allege to have suffered a reduction in the value of real property even though the property was not physically touched by oil and the property was not sold, (2) claims for economic losses based solely on consumers' decisions not to purchase fuel or goods from BP fuel stations and stores based on consumer animosity toward BP, and (3) claims by or on behalf of recreational fishermen, divers, beachgoers, boaters and others that allege damages such as loss of enjoyment of life from their inability to use portions of the Gulf of Mexico for recreational and amusement purposes. In dismissing those claims, the MDL court also noted that we are not liable with respect to those claims under the OPA because we are not a "responsible party" under OPA. A group of plaintiffs appealed the order, but the Fifth Circuit dismissed the appeal.

The first phase of the MDL trial, which concluded in April 2013, covered issues arising out of the conduct and degree of culpability of various parties allegedly relevant to the loss of well control, the ensuing fire and explosion on and sinking of the Deepwater Horizon, and the initiation of the release of hydrocarbons from the Macondo well. At the conclusion of the plaintiffs' case, we and the other defendants each submitted a motion requesting the MDL court to dismiss certain claims. In March 2013, the MDL court denied our motion and declined to dismiss any claims, including those alleging gross negligence against BP, Transocean and us. In addition, the MDL court dismissed all claims against M-I Swaco and claims alleging gross negligence against Cameron International Corporation (Cameron). In April 2013, the MDL court dismissed all remaining claims against Cameron, leaving BP, Transocean, and us as the remaining defendants with respect to the matters addressed during the first phase of the trial.

Also in March 2013, we advised the MDL court that we recently found a rig sample of dry cement blend collected at another well that was cemented before the Macondo well using the same dry cement blend as used on the Macondo production casing. In April 2013, we advised the MDL parties that we recently discovered some additional documents related to the Macondo well incident. BP and others have asked the court to impose sanctions and adverse findings against us because, according to their allegations, we should have identified the cement sample in 2010 and the additional documents by October 2011. BP also reasserted its previous allegations that we destroyed evidence relating to post-incident testing of the foam cement slurry on the Deepwater Horizon. The MDL court has not ruled on the requests for sanctions and adverse findings. We believe that the discoveries were the result of simple misunderstandings or mistakes and do not involve any material evidence, and that sanctions are not warranted.

When our plea agreement with the DOJ was announced in July 2013, BP filed a motion requesting that the MDL court re-open the evidence for phase one of the MDL trial to take into account our guilty plea and re-urging their request for sanctions. After the plea was entered, the PSC and the States of Alabama and Louisiana (as coordinating counsel for the states involved in the MDL) filed a motion likewise seeking to admit the guilty plea agreement and other court filings into evidence and asking that the MDL court use that evidence as a basis for assessing punitive damages against us. We filed replies opposing both motions and setting forth our position that the deleted post-incident computer simulations were not evidence, were not relevant, and in any event were re-created. The MDL court has not ruled on the motions.

The second phase of the MDL trial was split into two parts, with testimony presented in October 2013. The first part covered attempts to collect, control, or halt the flow of hydrocarbons from the well while the second part covered the quantification of hydrocarbons discharged from the well. The parties submitted proposed findings of fact and conclusions of law, post-trial briefs and responses during December 2013 and January 2014. According to a stipulation and post-trial filings, BP contends that 2.45 million barrels of oil were released into the Gulf of Mexico and the DOJ contends that a total of 4.2 million barrels were released. The MDL court has not issued a ruling on the questions that were the subject of the first two phases of the trial, although those rulings could be issued at any time.

Subsequent proceedings would be held to the extent triable issues remain unresolved by the first two phases of the trial, settlements, motion practice, or stipulation. Although the DOJ participated in the first two phases of the trial with regard to BP's conduct and the amount of hydrocarbons discharged from the well, the MDL court anticipates that the DOJ's civil action for the CWA violations, fines, and penalties will be addressed by the court in a third phase of the trial to the extent necessary.

Damages for the cases tried in the MDL proceeding, including punitive damages, are expected to be tried following the issuance of the MDL court's rulings regarding the phases of the trial described above. Under ordinary MDL procedures, such cases would, unless waived by the respective parties, be tried in the courts from which they were transferred into the MDL. It remains unclear, however, what impact the overlay of the Limitation Action will have on where these matters are tried. The judge has indicated that he intends for the State of Alabama's OPA compensatory damages claims against BP be tried as a test case.

We intend to vigorously defend any litigation, fines, and/or penalties relating to the Macondo well incident and to vigorously pursue any damages, remedies, or other rights available to us as a result of the Macondo well incident. We have incurred and expect to continue to incur significant legal fees and costs, some of which we expect to be covered by indemnity or insurance, as a result of the numerous investigations and lawsuits relating to the incident.

Indemnification and Insurance Our contract with BP Exploration relating to the Macondo well generally provides for our indemnification by BP Exploration for certain potential claims and expenses relating to the Macondo well incident, including those resulting from pollution or contamination (other than claims by our employees, loss or damage to our property, and any pollution emanating directly from our equipment). Also under our contract with BP Exploration, we have, among other things, generally agreed to indemnify BP Exploration and other contractors performing work on the well for claims for personal injury of our employees and subcontractors, as well as for damage to our property. In turn, we believe that BP Exploration was obligated to obtain agreement by other contractors performing work on the well to indemnify us for claims for personal injury of their employees or subcontractors, as well as for damages to their property. We have entered into separate indemnity agreements with Transocean and M-I Swaco, under which we have agreed to indemnify those parties for claims for personal injury of our employees and subcontractors and they have agreed to indemnify us for claims for personal injury of their employees and subcontractors.

In April 2011, we filed a lawsuit against BP Exploration in Harris County, Texas to enforce BP Exploration's contractual indemnity and alleging BP Exploration breached certain terms of the contractual indemnity provision. BP Exploration removed that lawsuit to federal court in the Southern District of Texas, Houston Division. We filed a motion to remand the case to Harris County, Texas, and the lawsuit was transferred to the MDL.

BP Exploration, in connection with filing its claims with respect to the MDL proceeding, asked that court to declare that it is not liable to us in contribution, indemnification, or otherwise with respect to liabilities arising from the Macondo well incident. Other defendants in the litigation discussed above have generally denied any obligation to contribute to any liabilities arising from the Macondo well incident.

In January 2012, the court in the MDL proceeding entered an order in response to our and BP's motions for summary judgment regarding certain indemnification matters. The court held that BP is required to indemnify us for third-party compensatory claims, or actual damages, that arise from pollution or contamination that did not originate from our property or equipment located above the surface of the land or water, even if we are found to be grossly negligent. The court did not express an opinion as to whether our conduct amounted to gross negligence, but we do not believe the performance of our services on the Deepwater Horizon constituted gross negligence. The court also held, however, that BP does not owe us indemnity for punitive damages or for civil penalties under the CWA, if any, and that fraud could void the indemnity on public policy grounds, although the court stated that it was mindful that mere failure to perform contractual obligations as promised does not constitute fraud. As discussed above, the DOJ is not seeking civil penalties from us under the CWA, but BP has filed a claim for equitable contribution against us with respect to its liabilities. The court in the MDL proceeding deferred ruling on whether our indemnification from BP covers penalties or fines under the OCSLA, whether our alleged breach of our contract with BP Exploration would invalidate the indemnity, and whether we committed an act that materially increased the risk to or prejudiced the rights of BP so as to invalidate the indemnity. We do not believe that we breached our contract with BP Exploration or committed an act that would otherwise invalidate the indemnity. The court's rulings will be subject to appeal at the appropriate time.

The rulings in the MDL proceeding regarding the indemnities are based on maritime law and may not bind the determination of similar issues in lawsuits not comprising a part of the MDL proceeding. Accordingly, it is possible that different conclusions with respect to indemnities will be reached by other courts.

Indemnification for criminal fines or penalties, if any, may not be available if a court were to find such indemnification unenforceable as against public policy. In addition, certain state laws, if deemed to apply, would not allow for enforcement of indemnification for gross negligence, and may not allow for enforcement of indemnification of persons who are found to be negligent with respect to personal injury claims.

In addition to the contractual indemnities discussed above, we have a general liability insurance program of \$600 million. Our insurance is designed to cover claims by businesses and individuals made against us in the event of property damage, injury, or death and, among other things, claims relating to environmental damage, as well as legal fees incurred in defending against those claims. We have received and expect to continue to receive payments from our insurers with respect to covered legal fees incurred in connection with the Macondo well incident. Through December 31, 2013, we have incurred legal fees and related expenses of approximately \$264 million, of which \$235 million has been reimbursed under or is expected to be covered by our insurance program. To the extent we incur any losses beyond those covered by indemnification, there can be no assurance that our insurance policies will cover all potential claims and expenses relating to the Macondo well incident. In addition, we may not be insured with respect to civil or criminal fines or penalties, if any, pursuant to the terms of our insurance policies. Insurance coverage can be the subject of uncertainties and, particularly in the event of large claims, potential disputes with insurance carriers, as well as other potential parties claiming insured status under our insurance policies.

BP's public filings indicate that BP has recognized in excess of \$40 billion in pre-tax charges, excluding offsets for settlement payments received from certain defendants in the proceedings described above under "Litigation," as a result of the Macondo well incident. BP's public filings also indicate that the amount of, among other things, certain natural resource damages with respect to certain OPA claims, some of which may be included in such charges, cannot be reliably estimated as of the dates of those filings.

Securities and related litigation

In June 2002, a class action lawsuit was filed against us in federal court alleging violations of the federal securities laws after the Securities and Exchange Commission (SEC) initiated an investigation in connection with our change in accounting for revenue on long-term construction projects and related disclosures. In the weeks that followed, approximately twenty similar class actions were filed against us. Several of those lawsuits also named as defendants several of our present or former officers and directors. The class action cases were later consolidated, and the amended consolidated class action complaint, styled *Richard Moore, et al v Halliburton Company, et al*, was filed and served upon us in April 2003. As a result of a substitution of lead plaintiffs, the case was styled *Archdiocese of Milwaukee Supporting Fund (AMSF) v Halliburton Company, et al*. AMSF has changed its name to Erica P. John Fund, Inc. (the Fund). We settled with the SEC in the second quarter of 2004.

In June 2003, the lead plaintiffs filed a motion for leave to file a second amended consolidated complaint, which was granted by the court. In addition to restating the original accounting and disclosure claims, the second amended consolidated complaint included claims arising out of our 1998 acquisition of Dresser Industries, Inc., including that we failed to timely disclose the resulting asbestos liability exposure.

In April 2005, the court appointed new co-lead counsel and named the Fund the new lead plaintiff, directing that it file a third consolidated amended complaint and that we file our motion to dismiss. The court held oral arguments on that motion in August 2005. In March 2006, the court entered an order in which it granted the motion to dismiss with respect to claims arising prior to June 1999 and granted the motion with respect to certain other claims while permitting the Fund to re-plead some of those claims to correct deficiencies in its earlier complaint. In April 2006, the Fund filed its fourth amended consolidated complaint. We filed a motion to dismiss those portions of the complaint that had been re-pled. A hearing was held on that motion in July 2006, and in March 2007 the court ordered dismissal of the claims against all individual defendants other than our Chief Executive Officer (CEO). The court ordered that the case proceed against our CEO and us.

In September 2007, the Fund filed a motion for class certification, and our response was filed in November 2007. The district court held a hearing in March 2008, and issued an order November 3, 2008 denying the motion for class certification. The Fund appealed the district court's order to the Fifth Circuit Court of Appeals. The Fifth Circuit affirmed the district court's order denying class certification. On May 13, 2010, the Fund filed a writ of certiorari in the United States Supreme Court. In January 2011, the Supreme Court granted the writ of certiorari and accepted the appeal. The Court heard oral arguments in April 2011 and issued its decision in June 2011, reversing the Fifth Circuit ruling that the Fund needed to prove loss causation in order to obtain class certification. The Court's ruling was limited to the Fifth Circuit's loss causation requirement, and the case was returned to the Fifth Circuit for further consideration of our other arguments for denying class certification. The Fifth Circuit returned the case to the district court, and in January 2012 the court issued an order certifying the class. We filed a Petition for Leave to Appeal with the Fifth Circuit, which was granted. In April 2013, the Fifth Circuit issued an order affirming the District Court's order certifying the class.

We filed a writ of certiorari with the United States Supreme Court seeking an appeal of the Fifth Circuit decision. In November 2013, the Supreme Court granted our writ. Oral argument is scheduled to be held before the Supreme Court on March 5, 2014. Fact discovery in this case has resumed. We cannot predict the outcome or consequences of this case, which we intend to vigorously defend.

Investigations

We are conducting internal investigations of certain areas of our operations in Angola and Iraq, focusing on compliance with certain company policies, including our Code of Business Conduct (COBC), and the FCPA and other applicable laws.

In December 2010, we received an anonymous e-mail alleging that certain current and former personnel violated our COBC and the FCPA, principally through the use of an Angolan vendor. The e-mail also alleges conflicts of interest, self-dealing, and the failure to act on alleged violations of our COBC and the FCPA. We contacted the DOJ to advise them that we were initiating an internal investigation.

During the second quarter of 2012, in connection with a meeting with the DOJ and the SEC regarding the above investigation, we advised the DOJ and the SEC that we were initiating unrelated, internal investigations into payments made to a third-party agent relating to certain customs matters in Angola and to third-party agents relating to certain customs and visa matters in Iraq.

Since the initiation of the investigations described above, we have participated in meetings with the DOJ and the SEC to brief them on the status of the investigations and have been producing documents to them both voluntarily and as a result of SEC subpoenas to us and certain of our current and former officers and employees.

We expect to continue to have discussions with the DOJ and the SEC regarding the Angola and Iraq matters described above and have indicated that we would further update them as our investigations progress. We have engaged outside counsel and independent forensic accountants to assist us with these investigations.

During the second quarter of 2013, we received a civil investigative demand from the Antitrust Division of the DOJ regarding pressure pumping services. We have engaged in discussions with the DOJ on this matter and have provided responses.

to the DOJ's information requests. We understand there have been others in our industry who have received similar correspondence from the DOJ, and we do not believe that we are being singled out for any particular scrutiny.

We intend to continue to cooperate with the DOJ's and the SEC's inquiries and requests in these investigations. Because these investigations are ongoing, we cannot predict their outcome or the consequences thereof.

Environmental

We are subject to numerous environmental, legal, and regulatory requirements related to our operations worldwide. In the United States, these laws and regulations include, among others:

- the Comprehensive Environmental Response Compensation and Liability Act,
- the Resource Conservation and Recovery Act
- the Clean Air Act,
- the Federal Water Pollution Control Act
- the Toxic Substances Control Act, and
- the Oil Pollution Act

In addition to the federal laws and regulations, states and other countries where we do business often have numerous environmental, legal, and regulatory requirements by which we must abide. We evaluate and address the environmental impact of our operations by assessing and remediating contaminated properties in order to avoid future liabilities and comply with environmental, legal, and regulatory requirements. Our Health, Safety, and Environment group has several programs in place to maintain environmental leadership and to help prevent the occurrence of environmental contamination. On occasion, in addition to the matters relating to the Macondo well incident described above, we are involved in other environmental litigation and claims, including the remediation of properties we own or have operated, as well as efforts to meet or correct compliance-related matters. We do not expect costs related to those claims and remediation requirements to have a material adverse effect on our liquidity, consolidated results of operations, or consolidated financial position. Excluding our loss contingency for the Macondo well incident, our accrued liabilities for environmental matters were \$66 million as of December 31, 2013 and \$72 million as of December 31, 2012. Because our estimated liability is typically within a range and our accrued liability may be the amount on the low end of that range, our actual liability could eventually be well in excess of the amount accrued. Our total liability related to environmental matters covers numerous properties.

In November 2012, we received an Enforcement Notice from the Pennsylvania Department of Environmental Protection (PADEP) regarding an alleged improper disposal of oil field acid in or around Homer City, Pennsylvania between 1999 and 2011. In February 2014, we agreed to resolve this matter for \$2 million to settle the PADEP's claim for civil penalties.

Additionally, we have subsidiaries that have been named as potentially responsible parties along with other third parties for nine federal and state Superfund sites for which we have established reserves. As of December 31, 2013, those nine sites accounted for approximately \$5 million of our \$66 million total environmental reserve. Despite attempts to resolve these Superfund matters, the relevant regulatory agency may at any time bring suit against us for amounts in excess of the amount accrued. With respect to some Superfund sites, we have been named a potentially responsible party by a regulatory agency, however, in each of those cases, we do not believe we have any material liability. We also could be subject to third-party claims with respect to environmental matters for which we have been named as a potentially responsible party.

Guarantee arrangements

In the normal course of business, we have agreements with financial institutions under which approximately \$2.1 billion of letters of credit, bank guarantees, or surety bonds were outstanding as of December 31, 2013, including \$192 million of surety bond guarantees related to our Venezuelan operations. Some of the outstanding letters of credit have triggering events that would entitle a bank to require cash collateralization.

Leases

We are party to numerous operating leases, principally for the use of land, offices, equipment, manufacturing and field facilities, and warehouses. Total rentals on our operating leases, net of sublease rentals, were \$958 million in 2013, \$850 million in 2012, and \$735 million in 2011.

Future total rentals on our noncancellable operating leases are \$946 million in the aggregate, which includes the following: \$282 million in 2014, \$215 million in 2015, \$156 million in 2016, \$83 million in 2017, \$56 million in 2018, and \$154 million thereafter.

Note 9. Income Taxes

The components of the (provision)/benefit for income taxes on continuing operations were

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Current income taxes			
Federal	\$ (245)	\$ (695)	\$ (1,026)
Foreign	(485)	(328)	(334)
State	(49)	(47)	(109)
Total current	(779)	(1,070)	(1,469)
Deferred income taxes			
Federal	4	(168)	(28)
Foreign	125	15	57
State	2	(12)	1
Total deferred	131	(165)	30
Provision for income taxes	\$ (648)	\$ (1,235)	\$ (1,439)

The United States and foreign components of income from continuing operations before income taxes were as follows

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
United States	\$ 1,070	\$ 2,826	\$ 4,040
Foreign	1,694	996	409
Total	\$ 2,764	\$ 3,822	\$ 4,449

Reconciliations between the actual provision for income taxes on continuing operations and that computed by applying the United States statutory rate to income from continuing operations before income taxes were as follows

	Year Ended December 31		
	2013	2012	2011
United States statutory rate	35.0 %	35.0 %	35.0 %
Impact of foreign income taxed at different rates	(9.3)	(2.5)	(0.5)
Domestic manufacturing deduction	(2.0)	(2.2)	(2.1)
State income taxes	1.7	1.6	1.6
Adjustments of prior year taxes	(1.3)	(0.6)	(1.5)
Other impact of foreign operations	(0.2)	(0.5)	(0.4)
Other items, net	(0.4)	1.5	0.2
Total effective tax rate on continuing operations	23.5 %	32.3 %	32.3 %

Our effective tax rate on continuing operations was 23.5% for 2013 and 32.3% for 2012 and 2011. The 2013 effective tax rate on continuing operations was positively impacted by several items during the year, including federal tax benefits of approximately \$ 50 million due to the reinstatement of certain tax benefits and credits related to the first quarter enactment of the American Taxpayer Relief Act of 2012. Also contributing to the lower tax rate in 2013 was a \$1.0 billion loss contingency related to the Macondo well incident, which was tax-effected at the United States statutory rate, as well as some favorable tax items in Latin America in the fourth quarter. Additionally, our effective tax rate was positively impacted by lower tax rates in certain foreign jurisdictions, as we continue to reposition our technology, supply chain, and manufacturing infrastructure to more effectively serve our customers internationally.

We have not provided United States income taxes and foreign withholding taxes on the undistributed earnings of foreign subsidiaries as of December 31, 2013 because we intend to permanently reinvest such earnings outside the United States. If these foreign earnings were to be repatriated in the future, the related United States tax liability may be reduced by any foreign income taxes previously paid on these earnings. As of December 31, 2013, the cumulative amount of earnings upon which United States income taxes have not been provided is approximately \$6.1 billion. It is not practicable to estimate the amount of unrecognized deferred tax liability related to these earnings at this time.

The primary components of our deferred tax assets and liabilities were as follows:

<i>Millions of dollars</i>	December 31	
	2013	2012
Gross deferred tax assets		
Net operating loss carryforwards	\$ 481	\$ 474
Accrued liabilities	600	329
Employee compensation and benefits	351	375
Other	162	160
Total gross deferred tax assets	1,594	1,338
Gross deferred tax liabilities		
Depreciation and amortization	1,185	859
Other	81	137
Total gross deferred tax liabilities	1,266	996
Valuation allowances – net operating loss carryforwards	374	395
Net deferred income tax asset (liability)	\$ (46)	\$ (53)

At December 31, 2013, we had \$1.6 billion of net operating loss carryforwards, of which \$161 million will expire from 2014 through 2017, \$295 million will expire from 2018 through 2022, and \$53 million will expire from 2023 through 2033. The remaining balance will not expire. The following table presents a rollforward of our unrecognized tax benefits and associated interest and penalties:

<i>Millions of dollars</i>	Unrecognized Tax Benefits	Interest and Penalties
Balance at January 1, 2011	\$ 177	\$ 32
Change in prior year tax positions	38	41
Change in current year tax positions	5	1
Cash settlements with taxing authorities	(12)	(3)
Lapse of statute of limitations	(3)	(2)
Balance at December 31, 2011	\$ 205	\$ 69
Change in prior year tax positions	16	(1)
Change in current year tax positions	14	1
Cash settlements with taxing authorities	(3)	—
Lapse of statute of limitations	(4)	(1)
Balance at December 31, 2012	\$ 228 (a)	\$ 68
Change in prior year tax positions	(53)	(9)
Change in current year tax positions	30	1
Cash settlements with taxing authorities	(21)	(17)
Lapse of statute of limitations	(9)	(9)
Balance at December 31, 2013	\$ 175 (a)(b)	\$ 34

- (a) Includes \$27 million as of December 31, 2013 and \$59 million as of December 31, 2012 in foreign unrecognized tax benefits that would give rise to a United States tax credit. The remaining balance of \$138 million, which excludes \$10 million of unrecognized tax benefits covered by an indemnification asset, as of December 31, 2013 and \$169 million as of December 31, 2012, if resolved in our favor, would positively impact the effective tax rate and, therefore, be recognized as additional tax benefits in our statement of operations.
- (b) Includes \$3 million that could be resolved within the next 12 months.

We file income tax returns in the United States federal jurisdiction and in various states and foreign jurisdictions. In most cases, we are no longer subject to state, local, or non-United States income tax examination by tax authorities for years before 2005. Tax filings of our subsidiaries, unconsolidated affiliates, and related entities are routinely examined in the normal course of business by tax authorities. Currently, our United States federal tax filings for the tax year 2012 is open for review, 2003 through 2009 are under appeal for tax items not agreed, and 2010 through 2011 are under examination by the Internal Revenue Service. During 2013, the Congressional Joint Committee on Taxation approved a \$135 million income tax refund, excluding interest, to us for tax items agreed upon for the tax years 2003 through 2009.

Note 10. Shareholders' Equity**Shares of common stock**

The following table summarizes total shares of common stock outstanding:

<i>Millions of shares</i>	December 31	
	2013	2012
Issued	1,072	1,073
In treasury	(223)	(144)
Total shares of common stock outstanding	849	929

In July 2013, our Board of Directors increased the authorization to purchase Halliburton common stock under our stock repurchase program by \$4.3 billion, to a new total repurchase capacity of \$5.0 billion. In August 2013, we repurchased approximately 68 million shares of our common stock for an aggregate cost of \$3.3 billion at a purchase price of \$48.50 per share, excluding fees and expenses, pursuant to a modified Dutch auction cash tender offer. Including the shares purchased pursuant to the tender offer, during the year ended December 31, 2013, we repurchased approximately 93 million shares of our common stock for a total cost of approximately \$4.4 billion at an average price of \$47.02 per share.

As of December 31, 2013, approximately \$1.7 billion of purchase authorization remained available under the stock repurchase program. The program does not require a specific number of shares to be purchased and the program may be effected through solicited or unsolicited transactions in the market or in privately negotiated transactions. The program may be terminated or suspended at any time. From the inception of this program in February 2006 through December 31, 2013, we repurchased approximately 188 million shares of our common stock for approximately \$7.6 billion at an average price per share of \$40.52.

Preferred stock

Our preferred stock consists of five million total authorized shares at December 31, 2013, of which none are issued.

Accumulated other comprehensive loss

Accumulated other comprehensive loss consisted of the following:

<i>Millions of dollars</i>	December 31	
	2013	2012
Defined benefit and other postretirement liability adjustments (a)	\$ (241)	\$ (241)
Cumulative translation adjustment	(69)	(69)
Other	3	1
Total accumulated other comprehensive loss	\$ (307)	\$ (309)

(a) Included net

actuarial losses for our international pension plans of \$222 million at December 31, 2013 and \$208 million at December 31, 2012.

Amounts reclassified out of accumulated other comprehensive loss and the tax effects allocated to each component of other comprehensive income were not material for the year ended December 31, 2013 or 2012.

Note 11. Stock-based Compensation

The following table summarizes stock-based compensation costs for the years ended December 31, 2013, 2012, and 2011.

<i>Millions of dollars</i>	Year Ended December 31		
	2013	2012	2011
Stock-based compensation cost	\$ 264	\$ 217	\$ 198
Tax benefit	(81)	(67)	(61)
Stock-based compensation cost, net of tax	\$ 183	\$ 150	\$ 137

Our Stock and Incentive Plan, as amended (Stock Plan), provides for the grant of any or all of the following types of stock-based awards:

- stock options, including incentive stock options and nonqualified stock options,
- restricted stock awards,
- restricted stock unit awards,
- stock appreciation rights; and
- stock value equivalent awards

There are currently no stock appreciation rights, stock value equivalent awards, or incentive stock options outstanding.

Under the terms of the Stock Plan, approximately 172 million shares of common stock have been reserved for issuance to employees and non-employee directors. At December 31, 2013, approximately 28 million shares were available for future grants under the Stock Plan. The stock to be offered pursuant to the grant of an award under the Stock Plan may be authorized but unissued common shares or treasury shares.

In addition to the provisions of the Stock Plan, we also have stock-based compensation provisions under our Restricted Stock Plan for Non-Employee Directors and our Employee Stock Purchase Plan (ESPP).

Each of the active stock-based compensation arrangements is discussed below.

Stock options

The majority of our options are generally issued during the second quarter of the year. All stock options under the Stock Plan are granted at the fair market value of our common stock at the grant date. Employee stock options vest ratably over a three- or four-year period and generally expire 10 years from the grant date. Compensation expense for stock options is generally recognized on a straight line basis over the entire vesting period. No further stock option grants are being made under the stock plans of acquired companies.

The following table represents our stock options activity during 2013.

	Number of Shares (in millions)	Weighted Average Exercise Price per Share	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value (in millions)
Outstanding at January 1, 2013	18.1	\$ 32.23		
Granted	5.4	43.06		
Exercised	(4.7)	27.35		
Forfeited/expired	(0.7)	37.37		
Outstanding at December 31, 2013	18.1	\$ 36.57	7.1	\$ 256
Exercisable at December 31, 2013	9.0	\$ 33.48	5.3	\$ 156

The total intrinsic value of options exercised was \$93 million in 2013, \$12 million in 2012, and \$102 million in 2011. As of December 31, 2013, there was \$83 million of unrecognized compensation cost, net of estimated forfeitures, related to nonvested stock options, which is expected to be recognized over a weighted average period of approximately two years.

Cash received from option exercises was \$277 million during 2013, \$107 million during 2012, and \$160 million during 2011.

The fair value of options at the date of grant was estimated using the Black-Scholes option pricing model. The expected volatility of options granted was a blended rate based upon implied volatility calculated on actively traded options on our common stock and upon the historical volatility of our common stock. The expected term of options granted was based upon historical observation of actual time elapsed between date of grant and exercise of options for all employees. The assumptions and resulting fair values of options granted were as follows:

	Year Ended December 31		
	2013	2012	2011
Expected term (in years)	5.27	5.21	5.20
Expected volatility	40%	46%	40%
Expected dividend yield	0.94 - 1.33%	0.99 - 1.24%	0.69 - 1.01%
Risk-free interest rate	0.77 - 1.73%	0.65 - 1.15%	0.93 - 2.29%
Weighted average grant-date fair value per share	\$14.34	\$11.99	\$15.61

Restricted stock

Restricted shares issued under the Stock Plan are restricted as to sale or disposition. These restrictions lapse periodically over an extended period of time not exceeding 10 years. Restrictions may also lapse for early retirement and other conditions in accordance with our established policies. Upon termination of employment, shares on which restrictions have not lapsed must be returned to us, resulting in restricted stock forfeitures. The fair market value of the stock on the date of grant is amortized and charged to income on a straight-line basis over the requisite service period for the entire award.

Our Restricted Stock Plan for Non-Employee Directors (Directors Plan) allows for each non-employee director to receive an annual award of 800 restricted shares of common stock or, beginning in 2012, an annual award of 800 restricted stock units representing the right to receive shares of common stock as a part of their compensation. These awards have a minimum restriction period of six months, and, with respect to the restricted share awards, the restrictions lapse upon the earlier of mandatory director retirement at age 72 or early retirement from the Board after four years of service. With respect to the restricted stock unit awards, the restrictions lapse 25% annually over four years of service. If the non-employee director has made a timely election to defer receipt of the shares upon vesting, then the shares are distributed at the end of January in the year following the year of the non-employee director's mandatory retirement at age 72 or early retirement from the Board after four years of service in a single distribution or in annual installments over a 5- or 10-year period as elected by the director.

The fair market value of the stock on the date of grant is amortized over the lesser of the time from the grant date to age 72 or the time from the grant date to completion of four years of service on the Board. We reserved 200,000 shares of common stock for issuance to non-employee directors, which may be authorized but unissued common shares or treasury shares. At December 31, 2013, 39,200 restricted shares and 13,506 restricted stock units were issued and outstanding under the Directors Plan. In addition, during 2013, our non-employee directors were awarded 29,797 restricted stock units under the Stock Plan with the same terms and conditions as those described above for the Directors Plan.

The following table represents our Stock Plan and Directors Plan restricted stock awards and restricted stock units granted, vested, and forfeited during 2013.

	Number of Shares (in millions)	Weighted Average Grant-Date Fair Value per Share
Nonvested shares at January 1, 2013	14.8	\$ 33.17
Granted	6.6	42.93
Vested	(4.7)	32.14
Forfeited	(1.0)	35.65
Nonvested shares at December 31, 2013	15.7	\$ 37.43

The weighted average grant-date fair value of shares granted during 2012 was \$32.17 and during 2011 was \$43.35. The total fair value of shares vested during 2013 was \$208 million, during 2012 was \$126 million, and during 2011 was \$165 million. As of December 31, 2013, there was \$420 million of unrecognized compensation cost, net of estimated forfeitures, related to nonvested restricted stock, which is expected to be recognized over a weighted average period of four years.

Employee Stock Purchase Plan

Under the ESPP, eligible employees may have up to 10% of their earnings withheld, subject to some limitations, to be used to purchase shares of our common stock. For the years ended December 31, 2012 and 2011, the ESPP contained two six-month offering periods commencing on January 1 and July 1. Beginning in 2013, the ESPP contained four three-month offering periods commencing on January 1, April 1, July 1, and October 1 of each year. The price at which common stock may be purchased under the ESPP is equal to 85% of the lower of the fair market value of the common stock on the commencement date or last trading day of each offering period. Under this plan, 44 million shares of common stock have been reserved for issuance. The stock to be offered may be authorized but unissued common shares or treasury shares. As of December 31, 2013, 33 million shares have been sold through the ESPP and 11 million shares are available for future issuance.

The fair value of ESPP shares was estimated using the Black-Scholes option pricing model. The expected volatility was a one-year historical volatility of our common stock. The assumptions and resulting fair values were as follows:

	Year Ended December 31		
	2013	2012	2011
Expected volatility	27%	49%	38%
Expected dividend yield	1.12%	1.16%	0.78%
Risk-free interest rate	0.06%	0.11%	0.14%
Weighted average grant-date fair value per share	\$ 8.40	\$ 8.93	\$ 11.88

Note 12. Income per Share

Basic income per share is based on the weighted average number of common shares outstanding during the period. Diluted income per share includes additional common shares that would have been outstanding if potential common shares with a dilutive effect had been issued. Differences between basic and diluted weighted average common shares outstanding for all periods presented resulted from the dilutive effect of awards granted under our stock incentive plans.

Excluded from the computation of diluted income per share are options to purchase three million shares of common stock that were outstanding in 2013, seven million shares of common stock that were outstanding in 2012, and three million shares of common stock that were outstanding in 2011. These options were outstanding during these years but were excluded because they were antidilutive, as the option exercise price was greater than the average market price of the common shares.

Note 13. Financial Instruments and Risk Management

At December 31, 2013, we held \$373 million of investments in fixed income securities with maturities that extend through November 2016 compared to \$398 million of investments in fixed income securities held at December 31, 2012. These securities are accounted for as available-for-sale and recorded at fair value as follows:

<i>Millions of dollars</i>	December 31, 2013			December 31, 2012		
	Level 1	Level 2	Total	Level 1	Level 2	Total
Fixed Income Securities						
U.S. treasuries (a)	\$ 100	—	\$ 100	\$ 150	—	\$ 150
Other (b)	—	273	273	—	248	248
Total	\$ 100	\$ 273	\$ 373	\$ 150	\$ 248	\$ 398

- (a) These securities are classified as "Other current assets" in our consolidated balance sheets.
- (b) Of these securities, \$139 million are classified as "Other current assets" and \$134 million are classified as "Other assets" on our consolidated balance sheets as of December 31, 2013, compared to \$120 million classified as "Other current assets" and \$128 million classified as "Other assets" as of December 31, 2012. These securities consist primarily of municipal bonds, corporate bonds, and other debt instruments.

Our Level 1 asset fair values are based on quoted prices in active markets and our Level 2 asset fair values are based on quoted prices for identical assets in less active markets. We have no financial instruments measured at fair value using unobservable inputs (Level 3). The carrying amount of cash and equivalents, receivables, and accounts payable, as reflected in the consolidated balance sheets, approximates fair value due to the short maturities of these instruments.

The carrying amount and fair value of our long-term debt is as follows:

<i>Millions of dollars</i>	December 31, 2013				December 31, 2012			
	Level 1	Level 2	Total fair value	Carrying value	Level 1	Level 2	Total fair value	Carrying value
Long-term debt	\$ 8,405	\$ 292	\$ 8,697	\$ 7,816	\$ 1,112	\$ 5,272	\$ 6,384	\$ 4,820

Our Level 1 debt fair values are calculated using quoted prices in active markets for identical liabilities with transactions occurring on the last two days of year-end. Our Level 2 debt fair values are calculated using significant observable inputs for similar liabilities where estimated values are determined from observable data points on our other bonds and on other similarly rated corporate debt or from observable data points of transactions occurring prior to two days from year-end and adjusting for changes in market conditions. We have no debt measured at fair value using unobservable inputs (Level 3).

We are exposed to market risk from changes in foreign currency exchange rates and interest rates. We selectively manage these exposures through the use of derivative instruments, including forward foreign exchange contracts, foreign exchange options, and interest rate swaps. The objective of our risk management strategy is to minimize the volatility from fluctuations in foreign currency and interest rates. We do not use derivative instruments for trading purposes. The fair value of our forward contracts, options, and interest rate swaps was not material as of December 31, 2013 or December 31, 2012. The counterparties to our derivatives are global commercial and investment banks.

Foreign currency exchange risk

We have operations in many international locations and are involved in transactions denominated in currencies other than the United States dollar, our functional currency, which exposes us to foreign currency exchange rate risk. Techniques in managing foreign currency exchange risk include, but are not limited to, foreign currency borrowing and investing and the use of currency exchange instruments, some of which are designed to mitigate the impact of foreign currency risks related to the Venezuelan bolívar. We attempt to selectively manage significant exposures to potential foreign currency exchange losses based on current market conditions, future operating activities, and the associated cost in relation to the perceived risk of loss. The purpose of our foreign currency risk management activities is to minimize the risk that our cash flows from the sale and purchase of services and products in foreign currencies will be adversely affected by changes in exchange rates.

We use forward contracts and options to manage our exposure to fluctuations in the currencies of the countries in which we do the majority of our international business. These instruments are not treated as hedges for accounting purposes, generally have an expiration date of one year or less, and are not exchange traded. While these instruments are subject to fluctuations in value, the fluctuations are generally offset by the value of the underlying exposures being managed. The use of some of these instruments may limit our ability to benefit from favorable fluctuations in foreign currency exchange rates.

Derivatives are not utilized to manage exposures in some currencies due primarily to the lack of available markets or cost considerations (non-traded currencies). We attempt to manage our working capital position to minimize foreign currency exposure in non-traded currencies and recognize that pricing for the services and products offered in these countries should account for the cost of exchange rate devaluations. We have historically incurred transaction losses in non-traded currencies.

The notional amounts of open foreign exchange derivatives were \$769 million at December 31, 2013 and \$324 million at December 31, 2012. The notional amounts of these instruments do not generally represent amounts exchanged by the parties, and thus are not a measure of our exposure or of the cash requirements related to these contracts. As such, cash flows related to these contracts are typically not material. The amounts exchanged are calculated by reference to the notional amounts and by other terms of the contracts, such as exchange rates.

Interest rate risk

We are subject to interest rate risk on our long-term debt and some of our long-term investments in fixed income securities. Our short-term borrowings and short-term investments in fixed income securities do not give rise to significant interest rate risk due to their short-term nature. We had fixed rate long-term debt totaling \$7.8 billion at December 31, 2013 and \$4.8 billion at December 31, 2012, with none maturing before 2016. We also had \$134 million of long-term investments in fixed income securities at December 31, 2013 with maturities that extend through November 2016.

We maintain an interest rate management strategy that is intended to mitigate the exposure to changes in interest rates in the aggregate for our investment portfolio. We hold a series of interest rate swaps relating to three of our debt instruments with a total notional amount of \$1.5 billion at a weighted-average, LIBOR-based, floating rate of 3.8% as of December 31, 2013. We utilize interest rate swaps to effectively convert a portion of our fixed rate debt to floating rates. These interest rate swaps, which expire when the underlying debt matures, are designated as fair value hedges of the underlying debt and are determined to be highly effective. The fair value of our interest rate swaps is included in "Other assets" in our consolidated balance sheets as of December 31, 2013 and December 31, 2012. The fair value of our interest rate swaps was determined using an income approach model with inputs, such as the notional amount, LIBOR rate spread, and settlement terms that are observable in the market or can be derived from or corroborated by observable data (Level 2). These derivative instruments are marked to market with gains and losses recognized currently in interest expense to offset the respective gains and losses recognized on changes in the fair value of the hedged debt. At December 31, 2013, we had fixed rate debt aggregating \$6.3 billion and variable rate debt aggregating \$1.5 billion, after taking into account the effects of the interest rate swaps.

Credit risk

Financial instruments that potentially subject us to concentrations of credit risk are primarily cash equivalents, investments in fixed income securities, and trade receivables. It is our practice to place our cash equivalents and investments in fixed income securities in high quality investments with various institutions. We derive the majority of our revenue from selling products and providing services to the energy industry. Within the energy industry, our trade receivables are generated from a broad and diverse group of customers. As of December 31, 2013, 34% of our gross trade receivables were in the United States and 8% were in Venezuela, compared to 36% in the United States and 9% in Venezuela at December 31, 2012. We maintain an allowance for losses based upon the expected collectability of all trade accounts receivable.

We do not have any significant concentrations of credit risk with any individual counterparty in our derivative contracts. We select counterparties to those contracts based on our belief that each counterparty's profitability, balance sheet, and capacity for timely payment of financial commitments is unlikely to be materially adversely affected by foreseeable events.

Note 14. Retirement Plans

Our company and subsidiaries have various plans that cover a significant number of our employees. These plans include defined contribution plans, defined benefit plans, and other postretirement plans.

- our defined contribution plans provide retirement benefits in return for services rendered. These plans provide an individual account for each participant and have terms that specify how contributions to the participant's account are to be determined rather than the amount of pension benefits the participant is to receive. Contributions to these plans are based on pretax income and/or discretionary amounts determined on an annual basis. Our expense for the defined contribution plans for continuing operations totaled \$313 million in 2013, \$293 million in 2012, and \$245 million in 2011.
- our defined benefit plans, which include both funded and unfunded pension plans, define an amount of pension benefit to be provided, usually as a function of age, years of service, and/or compensation. The unfunded obligations and net periodic benefit cost of our United States defined benefit plans were not material for the periods presented, and
- our postretirement plans other than pensions are offered to specific eligible employees. The accumulated benefit obligations and net periodic benefit cost for these plans were not material for the periods presented.

Funded status

For our international pension plans, at December 31, 2013, the projected benefit obligation was \$1.2 billion and the fair value of plan assets was \$887 million, which resulted in an unfunded obligation of \$268 million. At December 31, 2012, the projected benefit obligation was \$1.0 billion and the fair value of plan assets was \$754 million, which resulted in an unfunded obligation of \$276 million. The accumulated benefit obligation for our international plans was \$1.1 billion at December 31, 2013 and \$961 million at December 31, 2012.

The following table presents additional information about our international pension plans.

<i>Millions of dollars</i>	December 31	
	2013	2012
Amounts recognized on the Consolidated Balance Sheets		
Accrued employee compensation and benefits	\$ 17	\$ 10
Employee compensation and benefits	251	266
Pension plans in which projected benefit obligation exceeded plan assets		
Projected benefit obligation	\$ 1,123	\$ 1,004
Fair value of plan assets	854	727
Pension plans in which accumulated benefit obligation exceeded plan assets		
Accumulated benefit obligation	\$ 1,046	\$ 935
Fair value of plan assets	854	726

Fair value measurements of plan assets

The following table sets forth by level within the fair value hierarchy the fair value of assets held by our international pension plans

<i>Millions of dollars</i>	Level 1	Level 2	Level 3	Total
Common/collective trust funds (a)				
Equity funds	\$ —	\$ 247	\$ —	247
Bond funds	—	118	—	118
Balanced funds	—	13	—	13
Non-United States equity securities	165	—	—	165
United States equity securities	139	—	—	139
Corporate bonds	—	110	—	110
Other assets	2	59	34	95
Fair value of plan assets at December 31, 2013	\$ 306	\$ 547	\$ 34	887

Common/collective trust funds (a)				
Equity funds	\$ —	\$ 204	\$ —	204
Bond funds	—	112	—	112
Balanced funds	—	13	—	13
Non-United States equity securities	130	—	—	130
United States equity securities	110	—	—	110
Corporate bonds	—	107	—	107
Other assets	27	16	35	78
Fair value of plan assets at December 31, 2012	\$ 267	\$ 452	\$ 35	754

- (a) Strategies are generally to invest in equity or debt securities, or a combination thereof, that match or outperform certain predefined indices

Our Level 1 plan asset fair values are based on quoted prices in active markets for identical assets, our Level 2 plan asset fair values are based on significant observable inputs for similar assets, and our Level 3 plan asset fair values are based on significant unobservable inputs

Equity securities are traded in active markets and valued based on their quoted fair value by independent pricing vendors. Corporate bonds are valued using quotes from independent pricing vendors based on recent trading activity and other relevant information, including other observable inputs such as market interest rate curves, referenced credit spreads, and estimated prepayment rates. Common/collective trust funds are valued at the net asset value of units held by the plans at year-end.

Our investment strategy varies by country depending on the circumstances of the underlying plan. Typically, less mature plan benefit obligations are funded by using more equity securities, as they are expected to achieve long-term growth while exceeding inflation. More mature plan benefit obligations are funded using more fixed income securities, as they are expected to produce current income with limited volatility. The fixed income allocation is generally invested with a similar maturity profile to that of the benefit obligations to ensure that changes in interest rates are adequately reflected in the assets of the plan. Risk management practices include diversification by issuer, industry, and geography, as well as the use of multiple asset classes and investment managers within each asset class.

For our United Kingdom pension plan, which constituted 81% of our international pension plans' projected benefit obligation at December 31, 2013, the target asset allocation during 2013 and 2012 was 65% equity securities and 35% fixed income securities. Beginning in 2014, we are implementing a de-risking program intended to improve the funded status, with the plan's assets increasingly invested over time in low-risk fixed income securities.

Net periodic benefit cost

Net periodic benefit cost for our international pension plans was \$32 million in 2013, \$26 million in 2012, and \$27 million in 2011.

Actuarial assumptions

Certain weighted-average actuarial assumptions used to determine benefit obligations of our international pension plans at December 31 were as follows:

	2013	2012
Discount rate	4.8%	4.8%
Rate of compensation increase	5.5%	5.5%

Certain weighted-average actuarial assumptions used to determine net periodic benefit cost of our international pension plans for the years ended December 31 were as follows:

	2013	2012	2011
Discount rate	4.8%	5.2%	7.1%
Expected long-term return on plan assets	6.4%	6.5%	5.7%
Rate of compensation increase	5.5%	5.4%	6.2%

Assumed long-term rates of return on plan assets, discount rates for estimating benefit obligations, and rates of compensation increases vary by plan according to local economic conditions. Discount rates were determined based on the prevailing market rates of a portfolio of high-quality debt instruments with maturities matching the expected timing of the payment of the benefit obligations. Expected long-term rates of return on plan assets were determined based upon an evaluation of our plan assets and historical trends and experience, taking into account current and expected market conditions.

Other information

Contributions: Funding requirements for each plan are determined based on the local laws of the country where such plan resides. In certain countries the funding requirements are mandatory, while in other countries they are discretionary. We currently expect to contribute \$17 million to our international pension plans in 2014.

Benefit payments: Expected benefit payments over the next 10 years are approximately \$40 million annually for our international pension plans.

Note 15. Accounting Standards Recently Adopted

In February 2013, the Financial Accounting Standards Board issued an update to existing guidance on the presentation of comprehensive income. This update requires companies to report the effect of significant reclassifications out of accumulated other comprehensive income (AOCI) by component. For significant items reclassified out of AOCI to net income in their entirety during the reporting period, companies must report the effect on the line items in the statement where net income is presented. For significant items not reclassified to net income in their entirety during the period, companies must provide cross-references in the notes to other disclosures that already provide information about those amounts. We adopted this update effective January 1, 2013, and it did not have a material impact on our consolidated financial statements.

HALLIBURTON COMPANY
Selected Financial Data
(Unaudited)

Millions of dollars and shares

except per share and employee data

	Year ended December 31				
	2013	2012	2011	2010	2009
Total revenue	\$ 29,402	\$ 28,503	\$ 24,829	\$ 17,973	\$ 14,675
Total operating income	\$ 3,138	\$ 4,159	\$ 4,737	\$ 3,009	\$ 1,994
Nonoperating expense, net	(374)	(337)	(288)	(354)	(312)
Income from continuing operations before income taxes	2,764	3,822	4,449	2,655	1,682
Provision for income taxes	(648)	(1,235)	(1,439)	(853)	(518)
Income from continuing operations	\$ 2,116	\$ 2,587	\$ 3,010	\$ 1,802	\$ 1,164
Income (loss) from discontinued operations, net	19	58	(166)	40	(9)
Net income	\$ 2,135	\$ 2,645	\$ 2,844	\$ 1,842	\$ 1,155
Noncontrolling interest in net income of subsidiaries	(10)	(10)	(5)	(7)	(10)
Net income attributable to company	\$ 2,125	\$ 2,635	\$ 2,839	\$ 1,835	\$ 1,145
Amounts attributable to company shareholders:					
Income from continuing operations	\$ 2,106	\$ 2,577	\$ 3,005	\$ 1,795	\$ 1,154
Income (loss) from discontinued operations, net	19	58	(166)	40	(9)
Net income	2,125	2,635	2,839	1,835	1,145
Basic income per share attributable to shareholders:					
Income from continuing operations	\$ 2.35	\$ 2.78	\$ 3.27	\$ 1.98	\$ 1.28
Net income	2.37	2.85	3.09	2.02	1.27
Diluted income per share attributable to shareholders:					
Income from continuing operations	2.33	2.78	3.26	1.97	1.28
Net income	2.36	2.84	3.08	2.01	1.27
Cash dividends per share	0.525	0.36	0.36	0.36	0.36
Return on average shareholders' equity	14.45%	18.17%	24.06%	19.17%	13.88%
Financial position:					
Net working capital	\$ 8,678	\$ 8,334	\$ 7,456	\$ 6,129	\$ 5,749
Total assets	29,223	27,410	23,677	18,297	16,538
Property, plant, and equipment, net	11,322	10,257	8,492	6,842	5,759
Long-term debt (including current maturities)	7,816	4,820	4,820	3,824	4,574
Total shareholders' equity	13,615	15,790	13,216	10,387	8,757
Total capitalization	21,569	20,764	18,097	14,241	13,331
Basic weighted average common shares outstanding	898	926	918	908	900
Diluted weighted average common shares outstanding	902	928	922	911	902
Other financial data:					
Capital expenditures	\$ 2,934	\$ 3,566	\$ 2,953	\$ 2,069	\$ 1,864
Long-term borrowings (repayments), net	2,968	—	978	(790)	1,944
Depreciation, depletion, and amortization	1,900	1,628	1,359	1,119	931
Payroll and employee benefits	8,421	7,722	6,756	5,370	4,783
Number of employees	77,000	73,000	68,000	58,000	51,000

HALLIBURTON COMPANY
Quarterly Data and Market Price Information
(Unaudited)

<i>Millions of dollars except per share data</i>	Quarter				Year
	First ⁽¹⁾	Second	Third	Fourth	
2013					
Revenue	\$ 6,974	\$ 7,317	\$ 7,472	\$ 7,639	\$ 29,402
Operating income (loss)	(98)	984	1,108	1,144	3,138
Net income (loss)	(16)	648	708	795	2,135
Amounts attributable to company shareholders					
Income (loss) from continuing operations	(13)	642	707	770	2,106
Income (loss) from discontinued operations	(5)	2	(1)	23	19
Net income (loss) attributable to company	(18)	644	706	793	2,125
Basic income per share attributable to company shareholders					
Income (loss) from continuing operations	(0 01)	0 69	0 79	0 91	2 35
Income (loss) from discontinued operations	(0 01)	0 01	—	0 02	0 02
Net income (loss)	(0 02)	0 70	0 79	0 93	2 37
Diluted income per share attributable to company shareholders					
Income (loss) from continuing operations	(0 01)	0 69	0 79	0 90	2 33
Income (loss) from discontinued operations	(0 01)	—	—	0 03	0 03
Net income (loss)	(0 02)	0 69	0 79	0 93	2 36
Cash dividends paid per share	0 125	0 125	0 125	0 15	0 525
Common stock prices ⁽²⁾					
High	43.96	45 75	50 50	56.52	56 52
Low	35 07	36 77	41 86	47 99	35 07
2012					
Revenue	\$ 6,868	\$ 7,234	\$ 7,111	\$ 7,290	\$ 28,503
Operating income	1,023	1,201	954	981	4,159
Net income	630	739	604	672	2,645
Amounts attributable to company shareholders					
Income from continuing operations	635	745	608	589	2,577
Income (loss) from discontinued operations	(8)	(8)	(6)	80	58
Net income attributable to company	627	737	602	669	2,635
Basic income per share attributable to company shareholders					
Income from continuing operations	0 69	0 81	0 66	0 63	2 78
Income (loss) from discontinued operations	(0 01)	(0 01)	(0 01)	0 09	0 07
Net income	0 68	0 80	0 65	0 72	2 85
Diluted income per share attributable to company shareholders					
Income from continuing operations	0 69	0 80	0 65	0 63	2 78
Income (loss) from discontinued operations	(0 01)	(0 01)	—	0 09	0 06
Net income	0 68	0 79	0 65	0 72	2 84
Cash dividends paid per share	0 09	0 09	0 09	0 09	0 36
Common stock prices ⁽²⁾					
High	39.19	35 32	38.00	36 00	39 19
Low	32 02	26 28	27 62	29 83	26 28

(1) Includes a \$1 0 billion pre-tax charge in the first quarter of 2013 and a \$300 million pre-tax charge in the first quarter of 2012 related to the Marcellus well incident.

(2) New York Stock Exchange composite transactions high and low intraday price.

PART III

Item 10. Directors, Executive Officers, and Corporate Governance .

The information required for the directors of the Registrant is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the captions "Election of Directors" and "Involvement in Certain Legal Proceedings." The information required for the executive officers of the Registrant is included under Part I on pages 3 through 4 of this annual report. The information required for a delinquent form required under Section 16(a) of the Securities Exchange Act of 1934 is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Section 16(a) Beneficial Ownership Reporting Compliance," to the extent any disclosure is required. The information for our code of ethics is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Corporate Governance." The information regarding our Audit Committee and the independence of its members, along with information about the audit committee financial expert(s) serving on the Audit Committee, is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "The Board of Directors and Standing Committees of Directors."

Item 11. Executive Compensation.

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the captions "Compensation Discussion and Analysis," "Compensation Committee Report," "Summary Compensation Table," "Grants of Plan-Based Awards in Fiscal 2013," "Outstanding Equity Awards at Fiscal Year End 2013," "2013 Option Exercises and Stock Vested," "2013 Nonqualified Deferred Compensation," "Employment Contracts and Change-in-Control Arrangements," "Post-Termination or Change-in-Control Payments," "Equity Compensation Plan Information," and "Directors' Compensation."

Item 12(a). Security Ownership of Certain Beneficial Owners .

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Stock Ownership of Certain Beneficial Owners and Management."

Item 12(b). Security Ownership of Management.

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Stock Ownership of Certain Beneficial Owners and Management."

Item 12(c). Changes in Control.

Not applicable

Item 12(d). Securities Authorized for Issuance Under Equity Compensation Plans .

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Equity Compensation Plan Information."

Item 13. Certain Relationships and Related Transactions, and Director Independence.

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Corporate Governance" to the extent any disclosure is required and under the caption "The Board of Directors and Standing Committees of Directors."

Item 14. Principal Accounting Fees and Services .

This information is incorporated by reference to the Halliburton Company Proxy Statement for our 2014 Annual Meeting of Stockholders (File No 001-03492) under the caption "Fees Paid to KPMG LLP."

PART IV

Item 15. Exhibits.

- | | |
|-------------------|---|
| 1 | Financial Statements |
| | The reports of the Independent Registered Public Accounting Firm and the financial statements of Halliburton Company as required by Part II, Item 8, are included on pages 40 and 41 and pages 42 through 72 of this annual report. See index on page (i). |
| 2 | Financial Statement Schedules |
| | The schedules listed in Rule 5-04 of Regulation S-X (17 CFR 210 5-04) have been omitted because they are not applicable or the required information is shown in the consolidated financial statements or notes thereto. |
| 3 | Exhibits |
| Exhibit
Number | Exhibits |
| 3.1 | Restated Certificate of Incorporation of Halliburton Company filed with the Secretary of State of Delaware on May 30, 2006 (incorporated by reference to Exhibit 3.1 to Halliburton's Form 8-K filed June 5, 2006, File No. 001-03492) |
| 3.2 | By-laws of Halliburton Company revised effective July 18, 2013 (incorporated by reference to Exhibit 3.1 to Halliburton's Form 8-K filed July 19, 2013, File No. 001-03492) |
| 4.1 | Form of debt security of 8.75% Debentures due February 12, 2021 (incorporated by reference to Exhibit 4(a) to the Form 8-K of Halliburton Company, now known as Halliburton Energy Services, Inc. (the Predecessor), dated as of February 20, 1991, File No. 001-03492) |
| 4.2 | Senior Indenture dated as of January 2, 1991 between the Predecessor and The Bank of New York Trust Company, N.A. (as successor to Texas Commerce Bank National Association), as Trustee (incorporated by reference to Exhibit 4(b) to the Predecessor's Registration Statement on Form S-3 (Registration No. 33-38394) originally filed with the Securities and Exchange Commission on December 21, 1990), as supplemented and amended by the First Supplemental Indenture dated as of December 12, 1996 among the Predecessor, Halliburton and the Trustee (incorporated by reference to Exhibit 4.1 of Halliburton's Registration Statement on Form 8-B dated December 12, 1996, File No. 001-03492) |
| 4.3 | Resolutions of the Predecessor's Board of Directors adopted at a meeting held on February 11, 1991 and of the special pricing committee of the Board of Directors of the Predecessor adopted at a meeting held on February 11, 1991 and the special pricing committee's consent in lieu of meeting dated February 12, 1991 (incorporated by reference to Exhibit 4(c) to the Predecessor's Form 8-K dated as of February 20, 1991, File No. 001-03492) |
| 4.4 | Second Senior Indenture dated as of December 1, 1996 between the Predecessor and The Bank of New York Trust Company, N.A. (as successor to Texas Commerce Bank National Association), as Trustee, as supplemented and amended by the First Supplemental Indenture dated as of December 5, 1996 between the Predecessor and the Trustee and the Second Supplemental Indenture dated as of December 12, 1996 among the Predecessor, Halliburton and the Trustee (incorporated by reference to Exhibit 4.2 of Halliburton's Registration Statement on Form 8-B dated December 12, 1996, File No. 001-03492) |
| 4.5 | Third Supplemental Indenture dated as of August 1, 1997 between Halliburton and The Bank of New York Trust Company, N.A. (as successor to Texas Commerce Bank National Association), as Trustee, to the Second Senior Indenture dated as of December 1, 1996 (incorporated by reference to Exhibit 4.7 to Halliburton's Form 10-K for the year ended December 31, 1998, File No. 001-03492) |

- 4 6 Fourth Supplemental Indenture dated as of September 29, 1998 between Halliburton and The Bank of New York Trust Company, N A (as successor to Texas Commerce Bank National Association), as Trustee, to the Second Senior Indenture dated as of December 1, 1996 (incorporated by reference to Exhibit 4 8 to Halliburton's Form 10-K for the year ended December 31, 1998, File No 001-03492)
- 4 7 Resolutions of Halliburton's Board of Directors adopted by unanimous consent dated December 5, 1996 (incorporated by reference to Exhibit 4(g) of Halliburton's Form 10-K for the year ended December 31, 1996, File No 001-03492)
- 4 8 Form of debt security of 6 75% Notes due February 1, 2027 (incorporated by reference to Exhibit 4 1 to Halliburton's Form 8-K dated as of February 11, 1997, File No 001-03492)
- 4 9 Copies of instruments that define the rights of holders of miscellaneous long-term notes of Halliburton Company and its subsidiaries have not been filed with the Commission Halliburton Company agrees to furnish copies of these instruments upon request
- 4 10 Form of debt security of 7 53% Notes due May 12 2017 (incorporated by reference to Exhibit 4 4 to Halliburton's Form 10-Q for the quarter ended March 31, 1997, File No 001-03492)
- 4 11 Form of Indenture dated as of April 18, 1996 between Dresser and The Bank of New York Trust Company, N A (as successor to Texas Commerce Bank National Association), as Trustee (incorporated by reference to Exhibit 4 to Dresser's Registration Statement on Form S-3/A filed on April 19, 1996, Registration No 333-01303), as supplemented and amended by Form of First Supplemental Indenture dated as of August 6, 1996 between Dresser and The Bank of New York Trust Company, N A (as successor to Texas Commerce Bank National Association), Trustee for 7 60% Debentures due 2096 (incorporated by reference to Exhibit 4 1 to Dresser's Form 8-K filed on August 9, 1996, File No 1-4003)
- 4 12 Second Supplemental Indenture dated as of October 27, 2003 between DII Industries, LLC and The Bank of New York Trust Company, N A (as successor to JPMorgan Chase Bank), as Trustee, to the Indenture dated as of April 18, 1996 (incorporated by reference to Exhibit 4 15 to Halliburton's Form 10-K for the year ended December 31, 2003, File No 001-03492)
- 4 13 Third Supplemental Indenture dated as of December 12, 2003 among DII Industries, LLC, Halliburton Company and The Bank of New York Trust Company N A (as successor to JPMorgan Chase Bank), as Trustee, to the Indenture dated as of April 18, 1996, (incorporated by reference to Exhibit 4 16 to Halliburton's Form 10-K for the year ended December 31, 2003, File No 001-03492)
- 4 14 Indenture dated as of October 17, 2003 between Halliburton Company and The Bank of New York Trust Company, N A (as successor to JPMorgan Chase Bank), as Trustee (incorporated by reference to Exhibit 4 1 to Halliburton's Form 10-Q for the quarter ended September 30, 2003, File No 001-03492)
- 4 15 Second Supplemental Indenture dated as of December 15, 2003 between Halliburton Company and The Bank of New York Trust Company, N A (as successor to JPMorgan Chase Bank), as Trustee, to the Senior Indenture dated as of October 17, 2003 (incorporated by reference to Exhibit 4 27 to Halliburton's Form 10-K for the year ended December 31, 2003, File No 001-03492)
- 4 16 Form of note of 7 6% debentures due 2096 (included as Exhibit A to Exhibit 4 15 above)
- 4 17 Fourth Supplemental Indenture, dated as of September 12, 2008, between Halliburton Company and The Bank of New York Mellon Trust Company, N A , as successor trustee to JPMorgan Chase Bank, to the Senior Indenture dated as of October 17, 2003 (incorporated by reference to Exhibit 4 2 to Halliburton's Form 8-K filed September 12, 2008, File No 001-03492).
- 4 18 Form of Global Note for Halliburton's 5 90% Senior Notes due 2018 (included as part of Exhibit 4 17)

- 4 19 Form of Global Note for Halliburton's 6 70% Senior Notes due 2038 (included as part of Exhibit 4 17)
- 4 20 Fifth Supplemental Indenture, dated as of March 13, 2009, between Halliburton Company and The Bank of New York Mellon Trust Company, N A , as successor trustee to JPMorgan Chase Bank, to the Senior Indenture dated as of October 17, 2003 (incorporated by reference to Exhibit 4 2 to Halliburton's Form 8-K filed March 13, 2009, File No 001-03492)
- 4 21 Form of Global Note for Halliburton's 6 15% Senior Notes due 2019 (included as part of Exhibit 4 20)
- 4 22 Form of Global Note for Halliburton's 7 45% Senior Notes due 2039 (included as part of Exhibit 4 20)
- 4 23 Sixth Supplemental Indenture, dated as of November 14, 2011, between Halliburton Company and The Bank of New York Mellon Trust Company, N A , as successor trustee to JPMorgan Chase Bank, to the Senior Indenture dated as of October 17, 2003 (incorporated by reference to Exhibit 4 2 to Halliburton's Form 8-K filed November 14, 2011, File No 001-03492)
- 4 24 Form of Global Note for Halliburton's 3 25% Senior Notes due 2021 (included as part of Exhibit 4 23)
- 4 25 Form of Global Note for Halliburton's 4 50% Senior Notes due 2041 (included as part of Exhibit 4 23)
- 4 26 Seventh Supplemental Indenture dated as of August 5, 2013, between Halliburton Company and The Bank of New York Mellon Trust Company, N A , as successor trustee to JPMorgan Chase Bank (incorporated by reference to Exhibit 4 2 of Halliburton's Form 8-K filed August 5, 2013, File No 001-03492)
- 4 27 Form of Global Note for Halliburton's 1 00% Senior Notes due 2016 (included as part of Exhibit 4 26)
- 4 28 Form of Global Note for Halliburton's 2 00% Senior Notes due 2018 (included as part of Exhibit 4 26)
- 4 29 Form of Global Note for Halliburton's 3 50% Senior Notes due 2023 (included as part of Exhibit 4 26)
- 4 30 Form of Global Note for Halliburton's 4 75% Senior Notes due 2043 (included as part of Exhibit 4 26)
- † 10 1 Halliburton Company Restricted Stock Plan for Non-Employee Directors (incorporated by reference to Appendix B of the Predecessor's proxy statement dated March 23, 1993, File No 001-03492)
- † 10 2 Dresser Industries, Inc. Deferred Compensation Plan, as amended and restated effective January 1, 2000 (incorporated by reference to Exhibit 10 16 to Halliburton's Form 10-K for the year ended December 31, 2000, File No 001-03492)
- † 10 3 ERISA Excess Benefit Plan for Dresser Industries, Inc. as amended and restated effective June 1, 1995 (incorporated by reference to Exhibit 10 7 to Dresser's Form 10-K for the year ended October 31, 1995, File No 1-4003)
- † 10 4 ERISA Compensation Limit Benefit Plan for Dresser Industries, Inc. as amended and restated effective June 1, 1995 (incorporated by reference to Exhibit 10 8 to Dresser's Form 10-K for the year ended October 31, 1995, File No 1-4003)
- † 10 5 Employment Agreement (David I Lesar) (incorporated by reference to Exhibit 10(n) to the Predecessor's Form 10-K for the year ended December 31, 1995, File No 001-03492)

- † 10 6 Employment Agreement (Mark A. McCollum) (incorporated by reference to Exhibit 10 1 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 7 Halliburton Company Performance Unit Program (incorporated by reference to Exhibit 10 2 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- 10 8 Form of Indemnification Agreement for Officers (incorporated by reference to Exhibit 10 1 to Halliburton's Form 8-K filed August 3, 2007, File No. 001-03492)
- 10 9 Form of Indemnification Agreement for Directors (incorporated by reference to Exhibit 10 2 to Halliburton's Form 8-K filed August 3, 2007, File No. 001-03492)
- 10 10 Form of Indemnification Agreement for Officers (first elected after January 1, 2013) (incorporated by reference to Exhibit 10 2 to Halliburton's Form 10-Q for the quarter ended March 31, 2013, File No. 001-03492)
- 10 11 Form of Indemnification Agreement for Directors (first elected after January 1, 2013) (incorporated by reference to Exhibit 10 1 of Halliburton's Form 8-K filed March 22, 2013, File No. 001-03492)
- † 10 12 2008 Halliburton Elective Deferral Plan, as amended and restated effective January 1, 2008 (incorporated by reference to Exhibit 10 3 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 13 Halliburton Company Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2008 (incorporated by reference to Exhibit 10 4 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 14 Halliburton Company Benefit Restoration Plan, as amended and restated effective January 1, 2008 (incorporated by reference to Exhibit 10 5 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 15 Halliburton Company Pension Equalizer Plan, as amended and restated effective March 1, 2007 (incorporated by reference to Exhibit 10 8 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 16 Halliburton Company Directors' Deferred Compensation Plan, as amended and restated effective as of May 16, 2012 (incorporated by reference to Exhibit 10 5 to Halliburton's Form 10-Q for the quarter ended June 30, 2012, File No. 001-03492)
- † 10 17 Retirement Plan for the Directors of Halliburton Company, as amended and restated effective July 1, 2007 (incorporated by reference to Exhibit 10 10 to Halliburton's Form 10-Q for the quarter ended September 30, 2007, File No. 001-03492)
- † 10 18 Employment Agreement (James S. Brown) (incorporated by reference to Exhibit 10 36 to Halliburton's Form 10-K for the year ended December 31, 2007, File No. 001-03492)
- † 10 19 Executive Agreement (Lawrence J. Pope) (incorporated by reference to Exhibit 10 1 to Halliburton's Form 8-K filed December 12, 2008, File No. 001-03492)
- † 10 20 Halliburton Company Stock and Incentive Plan as amended and restated effective February 20, 2013 (incorporated by reference to Appendix B of Halliburton's proxy statement filed April 2, 2013, File No. 001-03492)

- † 10 21 Halliburton Company Employee Stock Purchase Plan, as amended and restated effective February 11, 2009 (incorporated by reference to Appendix C of Halliburton's proxy statement filed April 6, 2009, File No 001-03492)
- † 10 22 Form of Nonstatutory Stock Option Agreement (incorporated by reference to Exhibit 10 4 of Halliburton's Form 10-Q for the quarter ended September 30, 2009, File No 001-03492)
- † 10 23 Form of Restricted Stock Agreement (incorporated by reference to Exhibit 10 5 of Halliburton's Form 10-Q for the quarter ended September 30, 2009, File No 001-03492)
- † 10 24 Form of Restricted Stock Unit Agreement (incorporated by reference to Exhibit 10 6 of Halliburton's Form 10-Q for the quarter ended September 30, 2009, File No 001-03492)
- † 10 25 Form of Non-Employee Director Restricted Stock Unit Agreement (Director Plan) (incorporated by reference to Exhibit 99 8 of Halliburton's Form S-8 filed June 22, 2012, Registration No 333-182284)
- † 10 26 First Amendment to Halliburton Company Supplemental Executive Retirement Plan, as amended and restated effective January 1 2008 (incorporated by reference to Exhibit 10 1 to Halliburton's Form 8-K filed September 21, 2009, File No 001-03492)
- † 10 27 Amendment No 1 to Halliburton Company Benefit Restoration Plan, as amended and restated effective January 1, 2008 (incorporated by reference to Exhibit 10 2 to Halliburton's Form 8-K filed September 21, 2009, File No 001-03492)
- † 10 28 Halliburton Annual Performance Pay Plan, as amended and restated effective January 1, 2010 (incorporated by reference to Exhibit 10 3 to Halliburton's Form 8-K filed September 21, 2009, File No 001-03492)
- † 10 29 Amendment to Executive Employment Agreement (James S Brown) (incorporated by reference to Exhibit 10 39 to Halliburton's Form 10-K for the year ended December 31, 2008, File No 001-03492)
- † 10 30 Amendment to Executive Employment Agreement (Mark A McCollum) (incorporated by reference to Exhibit 10 43 to Halliburton's Form 10-K for the year ended December 31, 2008, File No 001-03492)
- † 10 31 Amendment No 1 to 2008 Halliburton Elective Deferral Plan, as amended and restated effective January 1, 2008 (incorporated by reference to Exhibit 10 41 to Halliburton's Form 10-K for the year ended December 31, 2010, File No 001-03492)
- † 10 32 Executive Agreement (Joe D Rainey) (incorporated by reference to Exhibit 10 43 to Halliburton's Form 10-K for the year ended December 31, 2010, File No 001-03492)
- 10 33 U S \$2,000,000,000 Five Year Revolving Credit Agreement among Halliburton Company, as Borrower, the Banks party thereto, and Citibank, N A , as Agent (incorporated by reference to Exhibit 10 1 to Halliburton's Form 8-K filed February 23, 2011, File No 001-03492)
- † 10 34 First Amendment dated February 10, 2011 to Halliburton Company Employee Stock Purchase Plan, as amended and restated effective February 11, 2009 (incorporated by reference to Exhibit 10 2 to Halliburton's Form 10-Q for the quarter ended March 31, 2011 File No 001-03492)
- † 10 35 First Amendment to the Retirement Plan for the Directors of Halliburton Company, effective September 1, 2007 (incorporated by reference to Exhibit 10 3 to Halliburton's Form 10-Q for the quarter ended March 31, 2011, File No 001-03492)

- † 10 36 Executive Agreement (Christian A. Garcia) (incorporated by reference to Exhibit 10 40 to Halliburton's Form 10-K for the year ended December 31, 2011. File No. 001-03492)
- † 10 37 First Amendment to Halliburton Company Restricted Stock Plan for Non-Employee Directors (incorporated by reference to Exhibit 10 41 to Halliburton's Form 10-K for the year ended December 31, 2011. File No. 001-03492)
- † 10 38 Form of Restricted Stock Agreement (Section 16 officers) (incorporated by reference to Exhibit 10 42 to Halliburton's Form 10-K for the year ended December 31, 2011, File No. 001-03492)
- † 10 39 Form of Non-Employee Director Restricted Stock Unit Agreement (Stock and Incentive Plan) (incorporated by reference to Exhibit 99 9 of Halliburton's Form S-8 filed June 22, 2012, Registration No. 333-182284)
- † 10 40 Second Amendment to Restricted Stock Plan for Non-Employee Directors of Halliburton Company (incorporated by reference to Exhibit 10 4 to Halliburton's Form 10-Q for the quarter ended June 30, 2012, File No. 001-03492)
- † 10 41 Third Amendment to Restricted Stock Plan for Non-Employee Directors of Halliburton Company effective December 1, 2012 (incorporated by reference to Exhibit 10 44 to Halliburton's Form 10-K for the year ended December 31, 2012, File No. 001-03492)
- † 10 42 First Amendment dated December 1, 2012 to Halliburton Company Directors' Deferred Compensation Plan, as amended and restated effective May 16, 2012 (incorporated by reference to Exhibit 10 45 to Halliburton's Form 10-K for the year ended December 31, 2012, File No. 001-03492)
- † 10 43 Executive Agreement (Jeffrey A. Miller) (incorporated by reference to Exhibit 10 1 to Halliburton's Form 8-K filed September 21, 2012, File No. 001-03492)
- † 10 44 Second Amendment dated December 11, 2012 to Halliburton Company Employee Stock Purchase Plan, as amended and restated effective February 11, 2009 (incorporated by reference to Exhibit 10 47 to Halliburton's Form 10-K for the year ended December 31, 2012, File No. 001-03492)
- † 10 45 Executive Agreement (Myrtle L. Jones) (incorporated by reference to Exhibit 10 1 to Halliburton's Form 10-Q for the quarter ended March 31, 2013, File No. 001-03492)
- † 10 46 First Amendment dated April 23, 2013 of the Five Year Revolving Credit Agreement among Halliburton Company, as Borrower, the Banks party thereto, and Citibank, N.A., as Agent effective February 22, 2011 (incorporated by reference to Exhibit 10 4 to Halliburton's Form 10-Q for the quarter ended March 31, 2013, File No. 001-03492)
- 10 47 Underwriting Agreement, dated July 29, 2013, among Halliburton Company and Citigroup Global Markets Inc., Deutsche Bank Securities Inc., HSBC Securities (USA) Inc., RBS Securities Inc. and the several other underwriters identified therein (incorporated by reference to Exhibit 1 1 of Halliburton's Form 8-K filed August 1, 2013, File No. 001-03492)
- *† 10 48 Executive Agreement (Robb L. Voyles)
- *† 10 49 Executive Agreement (Timothy McKeon)
- * 12 1 Statement of Computation of Ratio of Earnings to Fixed Charges
- * 21 1 Subsidiaries of the Registrant
- * 23 1 Consent of KPMG LLP

- * 24.1 Powers of attorney for the following directors signed in January 2014
 - Alan M. Bennett
 - James R. Boyd
 - Milton Carroll
 - Nance K. Dicciani
 - Murry S. Gerber
 - José C. Grubisich

 - Abdallah S. Jum'ah
 - Robert A. Malone
 - J. Landis Martin
 - Debra L. Reed

- * 31.1 Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
- * 31.2 Certification of Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
- ** 32.1 Certification of Chief Executive Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
- ** 32.2 Certification of Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

- * 9.5 Mine Safety Disclosures

- * 101.INS XBRL Instance Document
- * 101.SCH XBRL Taxonomy Extension Schema Document
- * 101.CAL XBRL Taxonomy Extension Calculation Linkbase Document
- * 101.LAB XBRL Taxonomy Extension Label Linkbase Document
- * 101.PRE XBRL Taxonomy Extension Presentation Linkbase Document
- * 101.DEF XBRL Taxonomy Extension Definition Linkbase Document

* Filed with this Form 10-K

** Furnished with this Form 10-K

† Management contracts or compensatory plans or arrangements

SIGNATURES

As required by Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has authorized this report to be signed on its behalf by the undersigned authorized individuals on this 7th day of February, 2014

HALLIBURTON COMPANY

By /s/ David J. Lesar
David J. Lesar
Chairman of the Board,
President, and Chief Executive Officer

As required by the Securities Exchange Act of 1934 this report has been signed below by the following persons in the capacities indicated on this 7th day of February, 2014

Signature

Title

/s/ David J. Lesar
David J. Lesar

Chairman of the Board, President,
Chief Executive Officer, and Director

/s/ Mark A. McCollum
Mark A. McCollum

Executive Vice President and
Chief Financial Officer

/s/ Christian A. Garcia
Christian A. Garcia

Senior Vice President and
Chief Accounting Officer

<u>Signature</u>	<u>Title</u>
* <u>Alan M. Bennett</u> Alan M. Bennett	Director
* <u>James R. Boyd</u> James R. Boyd	Director
* <u>Milton Carroll</u> Milton Carroll	Director
* <u>Nance K. Dicciani</u> Nance K. Dicciani	Director
* <u>Murry S. Gerber</u> Murry S. Gerber	Director
* <u>José C. Grubisich</u> José C. Grubisich	Director
* <u>Abdallah S. Jum'ah</u> Abdallah S. Jum'ah	Director
* <u>Robert A. Malone</u> Robert A. Malone	Director
* <u>J. Landis Martin</u> J. Landis Martin	Director
* <u>Debra L. Reed</u> Debra L. Reed	Director

/s/ Christina M. Ibrahim
*By Christina M. Ibrahim, Attorney-in-fact

EXECUTIVE AGREEMENT

This Executive Agreement ("**Agreement**") is entered into by and between Robb L. Voyles ("**Employee**") and Halliburton Company, for and on behalf of itself, its subsidiaries, and its affiliated companies (collectively, "**Employer**" or "**Company**"), as of September 1, 2013 (the "**Effective Date**")

RECITALS

WHEREAS, Employer desires to employ Employee pursuant to the terms and conditions and for the consideration set forth in this Agreement, and Employee desires to be employed by Employer pursuant to such terms and conditions and for such consideration

NOW THEREFORE, for and in consideration of the mutual promises, covenants, and obligations contained herein, Employer and Employee agree as follows

ARTICLE 1: EMPLOYMENT AND DUTIES:

1.1 Employer agrees to employ Employee, and Employee agrees to be employed by Employer, as of the Effective Date and continuing until the date of termination of Employee's employment pursuant to the provisions of Article 3, subject to the terms and conditions of this Agreement

1.2 As of the Effective Date, Employee will be employed as Senior Vice President, Law. Employee agrees to serve in the assigned position or in such other executive capacities as may be requested from time to time by Employer and to perform diligently and to the best of Employee's abilities the duties and services appertaining to such position as reasonably determined by Employer, as well as such additional or different duties and services appropriate to such positions which Employee from time to time may be reasonably directed to perform by Employer

1.3 Employee shall at all times comply with and be subject to such policies and procedures as Employer may establish from time to time, including, without limitation, the Halliburton Company Code of Business Conduct (the "**Code of Business Conduct**"), Company Policy 3-90020, "Director and Executive Compensation Administration" (with respect to the prohibition of discretionary payments in certain situations), Company Policy 3-90040, "Recoupment of Incentive Compensation", and Company Policy 3-90050, "Termination of Officers Who Participate in Violations or Disregard Supervisory Responsibilities", all of which have been made available to Employee and are available under "COBC" or "Policies" as posted on Halworld located at <http://halworld.corp.halliburton.com>, as well as Section 32(a) of the Halliburton Company By-Laws (with respect to the limitations on the advancement of legal expenses), a copy of which has been made available to Employee. By signing this Agreement, Employee hereby represents and warrants that he understands and agrees to the terms and conditions contained in such Code of Business Conduct, policies, and By-Laws

1.4 Employee shall, during the period of Employee's employment by Employer, devote Employee's full business time, energy, and best efforts to the business and affairs of Employer. Employee may not engage, directly or indirectly, in any other business, investment, or activity that interferes with Employee's performance of Employee's duties hereunder, is contrary to the interest of Employer or any of its affiliated companies (collectively, the "**Halliburton Entities**" or, individually, a "**Halliburton Entity**"), or requires any significant portion of Employee's business time. The foregoing notwithstanding, the parties recognize and agree that Employee may engage in passive personal investments and other business activities which do not conflict with the business and affairs of the Halliburton Entities or interfere with Employee's performance of his duties hereunder. Employee may not serve on the board of directors of any entity other

than a Halliburton Entity while employed by Employer without the approval thereof in accordance with Employer's policies and procedures regarding such service. Employee shall be permitted to retain any compensation received for approved service on any unaffiliated corporation's board of directors to the extent permitted under a Halliburton Entity's policies and procedures.

1.5 Employee acknowledges and agrees that Employee owes a fiduciary duty of loyalty, fidelity and allegiance to act at all times in the best interests of the Employer and the other Halliburton Entities and to do no act which would, directly or indirectly, injure any such entity's business, interests, or reputation. It is agreed that any direct or indirect interest in, connection with, or benefit from any outside activities, particularly commercial activities, which interest might in any way adversely affect Employer, or any Halliburton Entity, involves a possible conflict of interest. In keeping with Employee's fiduciary duties to Employer, Employee agrees that Employee shall not knowingly become involved in a conflict of interest with Employer or the Halliburton Entities, or upon discovery thereof, allow such a conflict to continue. Moreover, Employee shall not engage in any activity that might involve a possible conflict of interest without first obtaining approval in accordance with the applicable Halliburton Entity's policies and procedures.

1.6 Nothing contained herein shall be construed to preclude the transfer of Employee's employment to another Halliburton Entity ("**Subsequent Employer**") as of, or at any time after, the Effective Date and no such transfer shall be deemed to be a termination of employment for purposes of Article 3 hereof, provided, however, that, effective with such transfer, all of Employer's obligations hereunder shall be assumed by and be binding upon, and all of Employer's rights hereunder shall be assigned to, such Subsequent Employer and the defined term "Employer" as used herein shall thereafter be deemed amended to mean such Subsequent Employer. Except as otherwise provided above, all of the terms and conditions of this Agreement, including without limitation, Employee's rights and obligations, shall remain in full force and effect following such transfer of employment.

ARTICLE 2: COMPENSATION AND BENEFITS:

2.1 Employee's base salary as of the Effective Date will be six hundred twenty five thousand dollars (\$625,000) per annum, which shall be paid in accordance with the Employer's standard payroll practice for its executives. Employee's base salary may thereafter be increased from time to time with the approval of Halliburton Company's Board of Directors (the "**Board of Directors**"), its Compensation Committee (the "**Compensation Committee**"), or its delegate, as applicable. Such increased base salary shall become the minimum base salary under this Agreement and may not be decreased thereafter without the written consent of Employee, unless comparable reductions in salary are effective for all similarly situated executives of Employer.

2.2 Employee shall participate in the Annual Performance Pay Plan, or any successor annual incentive plan approved by the Compensation Committee, provided, however, that all determinations relating to Employee's participation, including, without limitation, those relating to the performance goals applicable to Employee and Employee's level of participation and payout opportunity, shall be made in the sole discretion of the person or committee to whom such authority has been granted pursuant to such plan's terms. A nomination recommendation has been approved by the Compensation Committee, or its delegate, as applicable, for Employee's participation for the 2013 plan year on a pro-rata basis with a plan level of 75% and challenge level at 150% of Employee's base salary, as adjusted for the partial plan year.

2.3 Employee shall be nominated for participation in the Performance Unit Program, or any similar successor long-term incentive program approved by the Compensation Committee; provided, however, that all determinations relating to Employee's participation, including, without limitation, those relating to the performance goals applicable to Employee and Employee's level of participation and incentive opportunity.

shall be made in accordance with applicable guidelines in place at the time of nomination, and Employee's participation shall further be subject to such other terms and conditions as set forth in the Performance Unit Program Terms and Conditions and other underlying documentation. A nomination recommendation has been approved by the Compensation Committee, or its delegate, as applicable, for Employee's participation for the 2013 - 2015 Cycle on a pro-rata basis with a target level opportunity of \$800,000 and challenge level opportunity of \$1,600,000, as adjusted for the partial cycle.

2.4 Employer shall pay or reimburse Employee for all actual, reasonable and customary expenses incurred by Employee in the course of his employment; including, but not limited to, travel, entertainment, subscriptions and dues associated with Employee's membership in professional, business and civic organizations; provided that such expenses are incurred and accounted for in accordance with Employer's applicable policies and procedures. Any reimbursement provided hereunder during one calendar year shall not affect the amount or availability of reimbursements in another calendar year. Any reimbursement provided hereunder shall be paid no later than the earlier of (i) the time prescribed under Employer's applicable policies and procedures, or (ii) the last day of the calendar year following the calendar year in which Employee incurred the reimbursable expense.

2.5 Employee shall be allowed to participate, on the same basis generally as other executive employees of Employer, in all general employee benefit plans and programs, including improvements or modifications of the same, which on the Effective Date or thereafter are made available by Employer to all or substantially all of Employer's similarly situated executive employees. Such benefits, plans, and programs may include, without limitation, medical, health, and dental care, life insurance, disability protection, and qualified and non-qualified retirement plans. Except as specifically provided herein, nothing in this Agreement is to be construed or interpreted to increase or alter in any way the rights, participation, coverage, or benefits under such benefit plans or programs provided to similarly-situated executive employees pursuant to the terms and conditions of such benefit plans and programs. While employed by Employer, Employee shall be eligible to receive awards under the Halliburton Company Stock and Incentive Plan ("SIP") or any successor stock-related plan adopted by the Board of Directors. As soon as practicable following the Effective Date, subject to the terms and conditions of the SIP and the applicable award agreements, Employee shall be nominated for an award of (i) 55,000 shares of Halliburton Company restricted stock to vest 20% annually over a five (5) year period, (ii) nonqualified stock options to purchase 100,000 shares of Halliburton Company common stock to vest 1/3 annually over a three (3) year period, and (iii) a restoration stock grant of 100,000 shares of Halliburton Company restricted stock to vest 100% after a three (3) year period. Employee agrees that the foregoing shall not be construed as a guarantee with respect to the type, amount or frequency of future awards, if any, such decisions being solely within the discretion of the Compensation Committee, or its delegate, as applicable.

2.6 Employee shall be nominated to participate in the Halliburton Company Supplemental Executive Retirement Plan for the 2013 Allocation Year in accordance with the terms and conditions of such plan.

2.7 Employer shall not, by reason of this Article 2, be obligated to institute, maintain, or refrain from changing, amending or discontinuing, any incentive compensation, employee benefit or stock or stock option program or plan, so long as such actions are similarly applicable to covered employees generally.

2.8 Employer may withhold from any compensation, benefits, or amounts payable under this Agreement all federal, state, city, or other taxes as may be required pursuant to any law or governmental regulation or ruling.

ARTICLE 3: TERMINATION OF EMPLOYMENT AND EFFECTS OF SUCH TERMINATION:

3.1 Employee's employment with Employer shall be terminated (i) upon the death of Employee, (ii) upon Employee's Retirement (as defined below), (iii) upon Employee's Permanent Disability (as defined below), or (iv) at any time by Employer upon written notice to Employee, or by Employee upon thirty (30) calendar days' written notice to Employer, for any or no reason. This Agreement may be terminated by Employer at any time upon one hundred and eighty (180) calendar days' written notice to Employee and no such termination of this Agreement shall be deemed a termination of employment for purposes of this Article 3.

3.2 If Employee's employment is terminated by reason of any of the following circumstances, Employee shall not be entitled to receive the benefits set forth in Section 3.4 hereof

- (i) Death
- (ii) Retirement "**Retirement**" shall mean either (a) Employee's retirement at or after normal retirement age (either voluntarily or pursuant to the applicable Halliburton Entity's retirement policy) or (b) the voluntary termination of Employee's employment by Employee in accordance with Employer's early retirement policy for other than Good Reason (as defined below)
- (iii) Permanent Disability "**Permanent Disability**" shall mean Employee's physical or mental incapacity to perform his usual duties with such condition likely to remain continuously and permanently as reasonably determined by a qualified physician selected by Employer
- (iv) Voluntary Termination "**Voluntary Termination**" shall mean a termination of employment in the sole discretion and at the election of Employee for other than Good Reason. "**Good Reason**" shall mean a termination of employment by Employee because of a material breach by Employer of any material provision of this Agreement, provided that (i) Employee provides written notice to Employer, as provided in Section 6.2 hereof, of the circumstances Employee claims constitute "Good Reason" within ninety (90) calendar days of the first to occur of such circumstances, (ii) such breach remains uncorrected for thirty (30) calendar days following written notice, and (iii) Employee's termination occurs within one hundred eighty (180) calendar days after the date that the circumstances Employee claims constitute "Good Reason" first occurred
- (v) Termination for Cause Termination of Employee's employment by Employer for Cause. "**Cause**" shall mean any of the following: (a) Employee's gross negligence or willful misconduct in the performance of the duties and services required of Employee pursuant to this Agreement, (b) Employee's final conviction of a felony, (c) a material violation of the Code of Business Conduct or (d) Employee's material breach of any material provision of this Agreement which remains uncorrected for thirty (30) calendar days following written notice of such breach to Employee by Employer. Determination as to whether or not Cause exists for termination of Employee's employment will be made by the Compensation Committee, or its delegate, acting in good faith
- (vi) Termination for Substantial Participation in a Significant Violation or Failure to Supervise Termination of Employee's employment by Employer following a determination, in accordance with the terms and procedures set out in Company Policy 3-90050, that (a) in connection with the performance of Employee's duties as an officer, Employee Substantially

Participated in a Significant Violation or both (A) had direct supervisory responsibility over an employee who Substantially Participated in such a violation and (B) Recklessly disregarded Employee's own supervisory responsibilities, and (b) Employee's conduct warrants termination

3.3 In the event Employee's employment is terminated under any of the circumstances described in Section 3.2, all future compensation to which Employee is otherwise entitled and all future benefits for which Employee is eligible shall cease and terminate as of the date of termination. Employee, or his estate in the case of Employee's death, shall be entitled to pro rata base salary through the date of such termination, payment for any properly documented but unreimbursed business expenses, and, except as may be prohibited by Company policy, shall be entitled to any individual annual incentive compensation not yet paid but earned and payable under Employer's plans for the year prior to the year of Employee's termination of employment, but shall not be entitled to any annual incentive compensation for the year in which he terminates employment or any other payments or benefits by or on behalf of Employer, except for those which may be payable pursuant to the terms of Employer's or Halliburton Entity's employee benefit plans (as defined in Section 3.5(b)), stock, stock option or incentive plans, or the applicable agreements underlying such plans

3.4 If Employee's employment is terminated by Employee for Good Reason or by Employer for any reason other than as set forth in Section 3.2 above, Employee shall be entitled to (A) the payment provided for in (i) below, subject to the provisions of Section 3.5, and (B) the payment provided for in (ii) below, as additional consideration for Employee's post-employment covenants under Article 5, subject to the provisions of (iii) below

- (i) A single lump sum cash payment equal to two (2) years of Employee's base salary as in effect at the date of Employee's termination of employment. Such benefit shall be paid as soon as administratively practicable, but no later than the sixtieth (60th) calendar day following Employee's termination of employment
- (ii) A single lump sum cash payment equal to the value of Employee's unvested shares of Halliburton Company restricted stock in accordance with the table below and based on the closing price quoted for Halliburton Company common stock on the New York Stock Exchange on the date of Employee's termination of employment or the last business day immediately preceding the date of Employee's termination of employment, with such payment, if due Employee, to be paid on the sixtieth (60th) calendar day following the second anniversary of Employee's termination of employment. (For example, if Employee holds 50,000 shares of unvested restricted stock on the date of termination of employment, has at least five (5) years of service, but less than seven (7) years of service, and the closing price of Halliburton Company common stock on that date is \$40 per share, the value for purposes of calculating the amount of the payment in this (ii) would be equal to [(50,000 shares X 0.50) X \$40 per share] or [25,000 shares X \$40 per share] or \$1,000,000.)
All remaining shares will be forfeited

Consecutive Years of Service	Vested Percentage
Less than two years	0%
At least two, but less than five years	25%
At least five, but less than seven years	50%
At least seven, but less than ten years	75%
Ten or more years	100%

- (iii) Employee understands and agrees that his right to all or any portion of the payment provided for in Section 3.4(u), and Employer's obligation to make payment of the entire amount or any portion thereof, are dependent and conditioned on Employee's compliance in full with all provisions contained in Article 5. Any failure on the part of Employee to comply with each provision, including any attempt by or on behalf of Employee to have any such provision declared unenforceable in whole or in part by an arbitrator or court, shall excuse Employer forever from the obligation to make the payment, in whole or in part, provided for in Section 3.4(u)

3.5 (a) The benefits paid to Employee pursuant to Section 3.4(i) shall be in consideration of Employee's continuing obligations hereunder after such termination, including, without limitation, Employee's obligations under Article 4. Further, as a condition to the receipt of such benefits, Employer, in its sole discretion, shall require Employee to first execute a release, in the form established by Employer, releasing Employer and all other Halliburton Entities, and their officers, directors, employees, and agents, from any and all claims and from any and all causes of action of any kind or character, including, but not limited to, all claims and causes of action arising out of Employee's employment with Employer and any other Halliburton Entities or the termination of such employment. The release must be executed by Employee within a period designated by Employer, which shall begin no earlier than the date of Employee's termination of employment and will end no later than the date that is fifty (50) calendar days after the date of Employee's termination of employment. The performance of Employer's obligations under Section 3.4(i) and the receipt of the benefits provided thereunder by Employee shall constitute full settlement of all such claims and causes of action. Such release shall also include the restrictions contained in Sections 3.6 - 3.9. Employee shall not be under any duty or obligation to seek or accept other employment following a termination of employment pursuant to which a benefit payment under Section 3.4(i) is owing and the amounts due Employee pursuant to Section 3.4(i) shall not be reduced or suspended if Employee accepts subsequent employment or earns any amounts as a self-employed individual. Employee's rights under Section 3.4(i) are Employee's sole and exclusive rights against the Employer or its affiliates and the Employer's sole and exclusive liability to Employee under this Agreement, in contract, tort, under statute or otherwise, for the termination of his employment relationship with Employer.

(b) Employee agrees that all disputes relating to Employee's termination of employment, including, without limitation, any dispute as to the occurrence of the events listed in Section 3.2, and any claims or demands against Employer based upon Employee's employment for any monies other than those specified in Section 3.4(i), shall be resolved through the Halliburton Company Dispute Resolution Plan ("**Dispute Resolution Plan**") as provided in Section 6.6 hereof, provided, however, that decisions as to whether any of the events listed in Section 3.2 have occurred, will be made by the Board of Directors, the Compensation Committee, or its delegate, as required under the applicable Company policy, and in any dispute by Employee with any such determination, the arbitrator's decision shall be limited to whether the Board of Directors, the Compensation Committee, or its delegate, reached such decision in good faith. Nothing contained in this Article 3 shall be construed to be a waiver by Employee of any benefits accrued for or due Employee under any employee benefit plan (as such term is defined in the Employee Retirement Income Security Act of 1974, as amended) maintained by Employer except that Employee shall not be entitled to any severance benefits pursuant to any severance plan or program of the Employer.

3.6 In consideration of the access to the confidential information contained in Article 4, Employee agrees that, for a period of two (2) years following separation of employment, the Employee will not directly or indirectly (a) solicit, induce to terminate or reduce its business, or (b) agree to provide products and/or services that compete directly with the material products and services provided, marketed, and/or under development by the Employer at any time during the three (3) years preceding the Employee's separation.

from employment with Employer for any person or entity who paid or engaged Employer for products and/or services, or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings, while Employee was employed by Employer, during the three (3) years preceding the Employee's separation from employment with Employer. However, this restriction applies only to those products and/or services that the Employee was personally involved in.

3.7 Employee further agrees that Employee will not, during the two (2) year period following separation of employment, solicit, directly or indirectly, or cause or permit others to solicit, directly or indirectly, any person (i) formerly employed by Employer during the six (6) month period immediately preceding or following Employee's termination of employment ("**Former Employee**") or (ii) employed by Employer ("**Current Employee**"). The term "**solicit**" includes, but is not limited to, the following (regardless of whether done directly or indirectly): (a) requesting that a Former or Current Employee change employment, (b) informing a Former or Current Employee that an opening exists elsewhere, (c) assisting a Former or Current Employee in finding employment elsewhere, (d) inquiring if a Former or Current Employee "knows of anyone who might be interested" in a position elsewhere; (e) inquiring if a Former or Current Employee might have an interest in employment elsewhere, (f) informing others of the name or status of, or other information about, a Former or Current Employee, or (g) any other similar conduct, the intended or actual effect of which is that a Former Employee affiliates with another employer or a Current Employee leaves the employment of Employer.

3.8 (a) In consideration of the access to confidential information and so as to enforce the confidentiality obligations contained in Article 4, the Employee specifically agrees that, for a period of two (2) years following separation of employment, except as permitted by Section 3.8(b) below, Employee will not engage, directly or indirectly, either as proprietor, stockholder, partner, officer, member, employee, consultant, or otherwise, in any existing or future business or in any existing or future division or unit of a commercially diverse business enterprise, that is owned in whole or in part or effectively controlled by any of the following companies:

Baker Hughes Inc., Cameron International Corporation, Diamond Offshore Drilling, Inc.; Ensco International, Inc., Exterran Holdings, Inc.; General Electric Company, Helmerich & Payne, Inc., Nabors Industries, Ltd., National Oilwell Varco, Inc., Noble Corporation, Oceaneering International, Inc.; Rowan Companies; Schlumberger Ltd., Tidewater Inc., Transocean, Ltd.; Weatherford International, Ltd.

(b) The above Section 3.8(a) notwithstanding, nothing in this Section 3.8 shall prohibit Employee and his affiliates from owning, as passive investors, in the aggregate not more than five (5) percent of equity securities of any of the companies listed in such Section 3.8(a).

3.9 Termination of the employment relationship, regardless of reason or circumstances, does not terminate those obligations imposed by this Agreement which are continuing obligations, including, without limitation, Employee's obligations under Articles 3.6 - 3.9 and 4.

ARTICLE 4: OWNERSHIP AND PROTECTION OF INTELLECTUAL PROPERTY AND CONFIDENTIAL INFORMATION:

4.1 All information, ideas, concepts, improvements, discoveries, works of authorship, and inventions, whether patentable or copyrightable or not, which are conceived, reduced to practice, authored, made, developed or acquired by Employee, individually or in conjunction with others, in the scope of Employee's employment by Employer or any of its affiliates, and/or during the term of Employee's employment (whether during business hours or otherwise and whether on Employer's premises or otherwise) which relate to the business, products or services of Employer or its affiliates (including, without limitation,

all such information relating to any corporate opportunities, research, financial and sales data, pricing and trading terms, evaluations, opinions, interpretations, acquisition prospects, the identity of customers or their requirements, the identity of key contacts within the customer's organizations or within the organization of acquisition prospects, or marketing and merchandising techniques, prospective names, and marks), and all documents, things, writings and items of any type or in any media embodying any of the foregoing (collectively, "**Developments**"), and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks, shall be the sole and exclusive property of Employer or its affiliates. as the case may be. Employee hereby assigns to Employer any and all rights Employee might otherwise have in and to any such Developments, and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks

4.2 In connection with its employment of Employee, Employer shall provide to Employee such Confidential Information of Employer as is reasonably necessary for Employee to perform Employee's obligations hereunder. Employee agrees that "**Confidential Information**" as used herein shall include, without limitation, Employer's trade secrets, confidential information concerning the businesses of Employer and its affiliates, and their strategies, methods, products, software, books, records, data and technical information concerning their products, equipment, services, and processes, procurement procedures and pricing techniques, and the names of and other information (such as credit and financial data) concerning their vendors, customers and business affiliates. Employee agrees that such Confidential Information constitutes valuable, special, and unique assets which Employer or its affiliates use in their business to obtain a competitive advantage over their competitors. Employee further agrees that protection of such Confidential Information against unauthorized disclosure and use is of critical importance to Employer and its affiliates in maintaining their competitive position. Employee shall not, at any time during or after the term of employment, use or disclose any Confidential Information of Employer or its affiliates, except to the extent needed to carry out Employee's obligations hereunder. Confidential Information shall not include information in the public domain (but only if the same becomes part of the public domain through a means other than a use or disclosure prohibited hereunder). The above notwithstanding, a disclosure shall not be unauthorized to the extent (i) it is required by law or by a court of competent jurisdiction or (ii) it is required in connection with any judicial, arbitration, dispute resolution or other legal proceeding in which Employee's legal rights and obligations as an employee or under this Agreement are at issue, provided, however, that Employee shall, to the extent practicable and lawful in any such event, give prior notice to Employer of Employee's intent to disclose any such confidential business information in such context so as to allow Employer or its affiliates an opportunity (which Employee will not oppose) to obtain such protective orders or similar relief with respect thereto as may be deemed appropriate, and that Employee shall limit any such disclosure to that required by the foregoing circumstances.

4.3 All written and electronic materials, records, and other documents and information made by, or coming into the possession of, Employee during the term of Employee's employment that contain or disclose any Confidential Information of Employer or its affiliates, and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks, shall be and remain the sole and exclusive property of Employer, or its affiliates, as the case may be. Upon termination of Employee's employment for any reason, Employee promptly shall deliver the same, and all copies thereof, to Employer.

4.4 For purposes of this Article 4, "**affiliates**" shall mean entities in which Employer has a 20% or more direct or indirect equity interest.

ARTICLE 5: POST-EMPLOYMENT COVENANTS

5.1 In consideration of the access to the Confidential Information (as described in Article 4) provided by Employer, and in consideration of the payment made under Section 3.4(i) to protect Employer's Confidential Information, and the goodwill, customer base, and contractual relationships of Employer, Employee agrees to the provisions of Sections 5.2, 5.3 and 5.4. Employee further agrees that the provisions in Sections 5.2, 5.3 and 5.4, and the provisions in Article 4, shall survive the termination of Employee's employment regardless of the reason for or circumstances of such termination (and regardless of whether such termination of employment is voluntary or involuntary on Employee's part).

5.2 Employee agrees that, for a period of two (2) years following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, directly or indirectly, either (a) solicit, encourage, or induce to terminate or reduce its business with Employer, any person or entity who paid or engaged Employer for products and/or services, or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings while Employee was employed by Employer, during the three (3) years preceding the termination of Employee's employment, or (b) provide any products and/or services, that compete directly with products and/or services provided, marketed, and/or under development by Employer at any time during the three (3) years preceding the termination of Employee's employment, to any person or entity who paid or engaged Employer for products and/or services, or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings while Employee was employed by Employer, during the three (3) years preceding the termination of Employee's employment, provided, however, that the foregoing restrictions in Section 5.2(b) apply only to those products and/or services of Employer with respect to which the Employee was directly involved or knowledgeable.

5.3 Employee further agrees that, for a period of two (2) years following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, solicit, directly or indirectly, or cause or permit others to solicit, directly or indirectly, any Former or Current Employee. The term "*solicit*" as used in this Section 5.3 shall have the same meaning provided for such term in Section 3.7 above.

5.4 Employee further agrees that, for a period of two (2) years following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, engage, directly or indirectly, either as proprietor, stockholder, partner, officer, member, employee, consultant, or otherwise, in any business, or in any division or unit of a commercially diverse business enterprise listed in Section 3.8(a) above, except as qualified by Section 3.8(b) above.

5.5 Employee agrees that (a) the covenants contained in Sections 5.2, 5.3 and 5.4 hereof are necessary for the protection of Employer's business, goodwill and Confidential Information, and (b) the compensation and other consideration received by Employee, including access to Confidential Information, are based on the parties' agreement to such covenants. Employee represents and warrants that the time, scope of activity and geographic area restricted by Sections 5.2, 5.3 and 5.4 are reasonable, especially in view of the worldwide scope of the business operations of Employer and the nature of the Confidential Information, that the enforcement of those restrictions contained in Sections 5.2, 5.3 and 5.4 would not be unduly burdensome to or impose any undue hardship on Employee, and that Employee will be able to earn a reasonable living while abiding by such covenants. Employee agrees that the restraints and provisions of Sections 5.2, 5.3 and 5.4 are no greater than necessary, and are as narrowly drafted as reasonably possible, to protect the legitimate interests of Employer, including the Confidential Information of Employer, including without limitation its trade secrets. Employee irrevocably waives all defenses to the strict enforcement of the covenants contained in Sections 5.2, 5.3 and 5.4, and agrees that the breach or violation, or threat thereof,

of the obligations and covenants set forth in any of such Sections shall entitle Employer, as a matter of right, to an injunction without the requirement of a bond, restraining any further or continued breach or violation of said obligations and covenants. The parties agree and acknowledge that the nature of Employer's business, including the locations of its projects, vendors, customers, and potential customers, is global in nature. Accordingly, the parties expressly agree that the foregoing restrictions on Employee need to be global in territorial scope to adequately protect Employer's Confidential Information and goodwill, and that such global territorial restriction is reasonable in view of Employer's business, Employee's position and responsibilities with Employer, and Employee's access to the Confidential Information of Employer. If the scope of any restriction contained in Sections 5.2, 5.3 or 5.4 is deemed by a court to be broader than reasonable, which the parties agree should not be the case, then such restriction shall be enforced to the maximum extent permitted by law, and Employee and Employer hereby agree that such scope may be judicially modified accordingly in any proceeding brought to enforce such restriction.

5.6 Employee agrees that the terms and conditions of this Agreement shall remain confidential as between the parties and he shall not disclose them to any other person. Without limiting the generality of the foregoing, Employee will not respond to or in any way participate in or contribute to any public discussion, notice or other publicity concerning, or in any way relating to, execution of this Agreement or its terms and conditions. Employee further agrees that he shall not make, directly or indirectly, whether in writing, orally or electronically, any negative, derogatory or other comment that could reasonably be expected to be detrimental to the Halliburton Entities, their business or operations or any of their current or former employees, officers or directors. The foregoing notwithstanding, Employee may disclose the terms of this Agreement to his immediate family, attorneys and financial advisors provided he informs them of this confidentiality provision and they agree to abide by it.

ARTICLE 6: MISCELLANEOUS:

6.1 Except as otherwise provided in Section 4.4 hereof, for purposes of this Agreement, the terms "*affiliate*" or "*affiliated*" means an entity who directly, or indirectly through one or more intermediaries, controls, is controlled by, or is under common control with a Halliburton Entity or in which a Halliburton Entity has a 50% or more equity interest.

6.2 For purposes of this Agreement, notices and all other communications provided for herein shall be in writing and shall be deemed to have been duly given when received by or tendered to Employee or Employer, as applicable, by pre-paid courier or by United States registered or certified mail, return receipt requested, postage prepaid, addressed as follows:

If to Employer, to Halliburton Company at 3000 North Sam Houston Parkway East, Houston, Texas 77032, to the attention of the Corporate Secretary, or to such other address as Employee shall receive notice thereof.

If to Employee, to his last known personal residence.

6.3 This Agreement shall be governed by and construed and enforced, in all respects in accordance with the law of the State of Texas, without regard to principles of conflicts of law, unless preempted by federal law, in which case federal law shall govern; provided, however, that the Dispute Resolution Plan and the Federal Arbitration Act shall govern in all respects with regard to the resolution of disputes hereunder. Employee and Employer further agree that any lawsuit, arbitration, or other proceeding arising out of or related in any way to this Agreement or their relationship shall be commenced and maintained only in the federal or state courts or before an arbitrator in Harris County, Texas, and each party waives any current or

future objection to such venue and hereby further agrees to submit to the jurisdiction of any duly authorized court or arbitrator in Harris County, Texas with respect to any such proceeding

6.4 No failure by either party hereto at any time to give notice of any breach by the other party of, or to require compliance with, any condition or provision of this Agreement shall be deemed a waiver of similar or dissimilar provisions or conditions at the same or at any prior or subsequent time.

6.5 It is a desire and intent of the parties that the terms, provisions, covenants, and remedies contained in this Agreement shall be enforceable to the fullest extent permitted by law. If any such term, provision, covenant, or remedy of this Agreement or the application thereof to any person, association, or entity or circumstances shall, to any extent, be construed to be invalid or unenforceable in whole or in part, then such term, provision, covenant, or remedy shall be construed in a manner so as to permit its enforceability under the applicable law to the fullest extent permitted by law. In any case, the remaining provisions of this Agreement or the application thereof to any person, association, or entity or circumstances other than those to which they have been held invalid or unenforceable, shall remain in full force and effect.

6.6 It is the mutual intention of the parties to have any dispute concerning this Agreement resolved out of court. Accordingly, the parties agree that any such dispute shall, as the sole and exclusive remedy, be submitted for resolution through the Dispute Resolution Plan, provided, however, that the Employer, on its own behalf and on behalf of any of the Halliburton Entities, shall be entitled to seek a restraining order or injunction in any court of competent jurisdiction to prevent any breach or the continuation of any breach of the provisions of Articles 3.6 through 3.9, 4 and/or 5 pending initiation or completion of proceedings under the Dispute Resolution Plan. Employee hereby consents that such restraining order or injunction may be granted without the necessity of the Employer posting any bond. The parties agree that the resolution of any such dispute through such plan shall be final and binding. A copy of the Dispute Resolution Plan, as currently in effect, has been made available to Employee and is available on Halworld under "DRP" located at <http://halworld.corp.halliburton.com>. Halliburton Company reserves the right to amend, or discontinue such plan, in accordance with, and subject to, the plan's provisions regarding same. By signing this Agreement, Employee hereby represents and warrants that he has read, understood and agrees to the terms and conditions contained in such Dispute Resolution Plan. **THE PARTIES ACKNOWLEDGE THAT, BY SIGNING THIS AGREEMENT, THEY ARE KNOWINGLY AND VOLUNTARILY WAIVING ANY RIGHT THAT THEY MAY HAVE TO A JURY TRIAL.**

6.7 This Agreement shall be binding upon and inure to the benefit of Employer, to the extent herein provided, Halliburton Entity and any other person, association, or entity which may hereafter acquire or succeed to all or substantially all of the business or assets of Employer by any means whether direct or indirect, by purchase, merger, consolidation, or otherwise. Employee's rights and obligations under this Agreement are personal and such rights, benefits, and obligations of Employee shall not be voluntarily or involuntarily assigned, alienated, or transferred, whether by operation of law or otherwise, without the prior written consent of Employer, other than in the case of death or incompetence of Employee.

6.8 This Agreement replaces and merges any previous agreements, understandings and discussions pertaining to the subject matter covered herein and therein. This Agreement constitutes the entire agreement of the parties with regard to the terms of Employee's employment, termination of employment and severance benefits, and contains all of the covenants, promises, representations, warranties, and agreements between the parties with respect to such matters. Each party to this Agreement acknowledges that no representation, inducement, promise, or agreement, oral or written, has been made by either party with respect to the foregoing matters which is not embodied herein, and that no agreement, statement, or promise relating to the employment of Employee by Employer that is not contained in this Agreement shall be valid or binding. Any modification of this Agreement will be effective only if it is in writing and signed.

by each party whose rights hereunder are affected thereby, provided that any such modification must be authorized or approved by the Compensation Committee or its delegate, as appropriate

6.9 Notwithstanding any provision of the Agreement to the contrary, the following provisions shall apply for purposes of complying with Section 409A of the Internal Revenue Code and applicable Treasury authorities ("**Section 409A**")

- (i) If Employee is a "**specified employee**," as such term is defined in Section 409A, any payments or benefits that are deferred compensation under Section 409A and are payable or provided as a result of Employee's termination of employment shall be payable on the date that is the earlier of (a) the date that is six months and one day after Employee's termination, (b) the date of Employee's death, or (c) the date that otherwise complies with the requirements of Section 409A
- (ii) It is intended that the provisions of this Agreement satisfy the requirements of Section 409A and that the Agreement be operated in a manner consistent with such requirements to the extent applicable. Therefore, the Employer and Employee agree to construe the provisions of the Plan in accordance with the requirements of Section 409A.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, Employer and Employee have duly executed this Agreement in multiple originals to be effective on the Effective Date

HALLIBURTON COMPANY

By /s/ Lawrence J Pope
Name Lawrence J Pope

Title: Executive Vice President - Administration and Chief

Human

Resources Officer

EMPLOYEE

/s/ Robb L Voyles
Name Robb L Voyles

EXECUTIVE AGREEMENT

This Executive Agreement ("**Agreement**") is entered into by and between Timothy McKeon ("**Employee**") and Halliburton Company, for and on behalf of itself, its subsidiaries, and its affiliated companies (collectively, "**Employer**" or "**Company**"), as of January 1, 2014 (the "**Effective Date**")

RECITALS

WHEREAS, Employee is currently employed by Employer, and

WHEREAS, Employer desires to continue the employment of Employee after the Effective Date pursuant to the terms and conditions and for the consideration set forth in this Agreement, and Employee desires to continue employment by Employer pursuant to such terms and conditions and for such consideration

NOW THEREFORE, for and in consideration of the mutual promises, covenants, and obligations contained herein, Employer and Employee agree as follows

ARTICLE 1: EMPLOYMENT AND DUTIES:

1.1 Employer agrees to employ Employee, and Employee agrees to be employed by Employer, as of the Effective Date and continuing until the date of termination of Employee's employment pursuant to the provisions of Article 3, subject to the terms and conditions of this Agreement

1.2 As of the Effective Date, Employee is employed as Vice President and Treasurer. Employee agrees to serve in the assigned position or in such other executive capacities as may be requested from time to time by Employer and to perform diligently and to the best of Employee's abilities the duties and services appertaining to such position as reasonably determined by Employer, as well as such additional or different duties and services appropriate to such positions which Employee from time to time may be reasonably directed to perform by Employer

1.3 Employee shall at all times comply with and be subject to such policies and procedures as Employer may establish from time to time, including, without limitation, the Halliburton Company Code of Business Conduct (the "**Code of Business Conduct**"), Company Policy 3-90020, "Director and Executive Compensation Administration" (with respect to the prohibition of discretionary payments in certain situations), Company Policy 3-90040, "Recoupment of Incentive Compensation", and Company Policy 3-90050, "Termination of Officers Who Participate in Violations or Disregard Supervisory Responsibilities", all of which have been made available to Employee and are available under "COBC" or "Policies" as posted on Halworld located at <http://halworld.corp.halliburton.com>, as well as Section 32(a) of the Halliburton Company By-Laws (with respect to the limitations on the advancement of legal expenses), a copy of which has been made available to Employee. By signing this Agreement, Employee hereby represents and warrants that he has read, understood and agrees to the terms and conditions contained in such Code of Business Conduct, policies, and By-Laws

1.4 Employee shall, during the period of Employee's employment by Employer, devote Employee's full business time, energy, and best efforts to the business and affairs of Employer. Employee may not engage, directly or indirectly, in any other business, investment, or activity that interferes with Employee's performance of Employee's duties hereunder, is contrary to the interest of Employer or any of its affiliated companies (collectively, the "**Halliburton Entities**" or, individually, a "**Halliburton Entity**"), or requires any significant portion of Employee's business time. The foregoing notwithstanding, the parties recognize and agree that Employee may engage in passive personal investments and other business activities

which do not conflict with the business and affairs of the Halliburton Entities or interfere with Employee's performance of his duties hereunder. Employee may not serve on the board of directors of any entity other than a Halliburton Entity while employed by Employer without the approval thereof in accordance with Employer's policies and procedures regarding such service. Employee shall be permitted to retain any compensation received for approved service on any unaffiliated corporation's board of directors to the extent permitted under a Halliburton Entity's policies and procedures.

1.5 Employee acknowledges and agrees that Employee owes a fiduciary duty of loyalty, fidelity and allegiance to act at all times in the best interests of the Employer and the other Halliburton Entities and to do no act which would, directly or indirectly, injure any such entity's business, interests, or reputation. It is agreed that any direct or indirect interest in, connection with, or benefit from any outside activities, particularly commercial activities, which interest might in any way adversely affect Employer, or any Halliburton Entity, involves a possible conflict of interest. In keeping with Employee's fiduciary duties to Employer, Employee agrees that Employee shall not knowingly become involved in a conflict of interest with Employer or the Halliburton Entities, or upon discovery thereof, allow such a conflict to continue. Moreover, Employee shall not engage in any activity that might involve a possible conflict of interest without first obtaining approval in accordance with the applicable Halliburton Entity's policies and procedures.

1.6 Nothing contained herein shall be construed to preclude the transfer of Employee's employment to another Halliburton Entity ("**Subsequent Employer**") as of, or at any time after, the Effective Date and no such transfer shall be deemed to be a termination of employment for purposes of Article 3 hereof, provided, however, that, effective with such transfer, all of Employer's obligations hereunder shall be assumed by and be binding upon, and all of Employer's rights hereunder shall be assigned to, such Subsequent Employer and the defined term "Employer" as used herein shall thereafter be deemed amended to mean such Subsequent Employer. Except as otherwise provided above, all of the terms and conditions of this Agreement, including without limitation, Employee's rights and obligations, shall remain in full force and effect following such transfer of employment.

ARTICLE 2: COMPENSATION AND BENEFITS:

2.1 Employee's base salary as of the Effective Date is two hundred seventy five thousand dollars (\$275,000) per annum, which shall be paid in accordance with the Employer's standard payroll practice for its executives. Employee's base salary may thereafter be increased from time to time with the approval of Halliburton Company's Board of Directors (the "**Board of Directors**"), its Compensation Committee (the "**Compensation Committee**"), or its delegate, as applicable. Such increased base salary shall become the minimum base salary under this Agreement and may not be decreased thereafter without the written consent of Employee, unless comparable reductions in salary are effective for all similarly situated executives of Employer.

2.2 Employee shall participate in the Annual Performance Pay Plan, or any successor annual incentive plan approved by the Compensation Committee; provided, however, that all determinations relating to Employee's participation, including, without limitation, those relating to the performance goals applicable to Employee and Employee's level of participation and payout opportunity, shall be made in the sole discretion of the person or committee to whom such authority has been granted pursuant to such plan's terms.

2.3 Employee shall be nominated for participation in the Performance Unit Program, or any similar successor long-term incentive program approved by the Compensation Committee; provided, however, that all determinations relating to Employee's participation, including, without limitation, those relating to the performance goals applicable to Employee and Employee's level of participation and incentive opportunity shall be made in accordance with applicable guidelines in place at the time of nomination, and Employee's

participation shall further be subject to such other terms and conditions as set forth in the Performance Unit Program Terms and Conditions and other underlying documentation

2.4 Employer shall pay or reimburse Employee for all actual, reasonable and customary expenses incurred by Employee in the course of his employment, including, but not limited to, travel, entertainment, subscriptions and dues associated with Employee's membership in professional, business and civic organizations, provided that such expenses are incurred and accounted for in accordance with Employer's applicable policies and procedures. Any reimbursement provided hereunder during one calendar year shall not affect the amount or availability of reimbursements in another calendar year. Any reimbursement provided hereunder shall be paid no later than the earlier of (i) the time prescribed under Employer's applicable policies and procedures, or (ii) the last day of the calendar year following the calendar year in which Employee incurred the reimbursable expense

2.5 Employee shall be allowed to participate, on the same basis generally as other executive employees of Employer, in all general employee benefit plans and programs, including improvements or modifications of the same, which on the Effective Date or thereafter are made available by Employer to all or substantially all of Employer's similarly situated executive employees. Such benefits, plans, and programs may include, without limitation, medical, health, and dental care, life insurance, disability protection, and qualified and non-qualified retirement plans. Except as specifically provided herein, nothing in this Agreement is to be construed or interpreted to increase or alter in any way the rights, participation, coverage, or benefits under such benefit plans or programs than provided to similarly-situated executive employees pursuant to the terms and conditions of such benefit plans and programs. While employed by Employer, Employee shall be eligible to receive awards under the Halliburton Company Stock and Incentive Plan or any successor stock-related plan adopted by the Board of Directors

2.6 Employer shall not, by reason of this Article 2, be obligated to institute, maintain, or refrain from changing, amending or discontinuing, any incentive compensation, employee benefit or stock or stock option program or plan, so long as such actions are similarly applicable to covered employees generally

2.7 Employer may withhold from any compensation, benefits, or amounts payable under this Agreement all federal, state, city, or other taxes as may be required pursuant to any law or governmental regulation or ruling

ARTICLE 3: TERMINATION OF EMPLOYMENT AND EFFECTS OF SUCH TERMINATION:

3.1 Employee's employment with Employer shall be terminated (i) upon the death of Employee, (ii) upon Employee's Retirement (as defined below), (iii) upon Employee's Permanent Disability (as defined below), or (iv) at any time by Employer upon written notice to Employee, or by Employee upon thirty (30) calendar days' written notice to Employer, for any or no reason. This Agreement may be terminated by Employer at any time upon one hundred and eighty (180) calendar days' written notice to Employee and no such termination of this Agreement shall be deemed a termination of employment for purposes of this Article 3.

3.2 If Employee's employment is terminated by reason of any of the following circumstances, Employee shall not be entitled to receive the benefits set forth in Section 3.4 hereof

(i) Death

(ii) Retirement "**Retirement**" shall mean either (a) Employee's retirement at or after normal retirement age (either voluntarily or pursuant to the applicable Halliburton Entity's retirement

policy) or (b) the voluntary termination of Employee's employment by Employer in accordance with Employer's early retirement policy for other than Good Reason (as defined below)

- (iii) Permanent Disability "**Permanent Disability**" shall mean Employee's physical or mental incapacity to perform his usual duties with such condition likely to remain continuously and permanently as reasonably determined by a qualified physician selected by Employer
- (iv) Voluntary Termination "**Voluntary Termination**" shall mean a termination of employment in the sole discretion and at the election of Employee for other than Good Reason "**Good Reason**" shall mean a termination of employment by Employer because of a material breach by Employer of any material provision of this Agreement, provided that (i) Employee provides written notice to Employer, as provided in Section 6.2 hereof, of the circumstances Employee claims constitute "Good Reason" within ninety (90) calendar days of the first to occur of such circumstances, (ii) such breach remains uncorrected for thirty (30) calendar days following written notice, and (iii) Employee's termination occurs within one hundred eighty (180) calendar days after the date that the circumstances Employee claims constitute "Good Reason" first occurred
- (v) Termination for Cause. Termination of Employee's employment by Employer for Cause. "**Cause**" shall mean any of the following. (a) Employee's gross negligence or willful misconduct in the performance of the duties and services required of Employee pursuant to this Agreement, (b) Employee's final conviction of a felony, (c) a material violation of the Code of Business Conduct or (d) Employee's material breach of any material provision of this Agreement which remains uncorrected for thirty (30) calendar days following written notice of such breach to Employee by Employer. Determination as to whether or not Cause exists for termination of Employee's employment will be made by the Compensation Committee, or its delegate, acting in good faith.
- (vi) Termination for Substantial Participation in a Significant Violation or Failure to Supervise. Termination of Employee's employment by Employer following a determination, in accordance with the procedures set out in Company Policy 3-90050, that (a) in connection with the performance of Employee's duties as an officer, Employee Substantially Participated in a Significant Violation or both (A) had direct supervisory responsibility over an employee who Substantially Participated in such a violation and (B) Recklessly disregarded Employee's own supervisory responsibilities, and (b) Employee's conduct warrants termination

3.3 In the event Employee's employment is terminated under any of the circumstances described in Section 3.2, all future compensation to which Employee is otherwise entitled and all future benefits for which Employee is eligible shall cease and terminate as of the date of termination. Employee, or his estate in the case of Employee's death, shall be entitled to pro rata base salary through the date of such termination, payment for any properly documented but unreimbursed business expenses, and, except as may be prohibited by Company policy, shall be entitled to any individual annual incentive compensation not yet paid but earned and payable under Employer's plans for the year prior to the year of Employee's termination of employment, but shall not be entitled to any annual incentive compensation for the year in which he terminates employment or any other payments or benefits by or on behalf of Employer, except for those which may be payable pursuant to the terms of Employer's or Halliburton Entity's employee benefit plans (as defined in Section 3.5(b)), stock, stock option or incentive plans, or the applicable agreements underlying such plans

3.4 If Employee's employment is terminated by Employer for Good Reason or by Employer for

any reason other than as set forth in Section 3.2 above, Employee shall be entitled to (A) the payment provided for in (i) below, subject to the provisions of Section 3.5, and (B) the payment provided for in (ii) below, as additional consideration for Employee's post-employment covenants under Article 5, subject to the provisions of (iii) below.

- (i) A single lump sum cash payment equal to one year of Employee's base salary as in effect at the date of Employee's termination of employment. Such benefit shall be paid as soon as administratively practicable, but no later than the sixtieth (60th) calendar day following Employee's termination of employment.
- (ii) A single lump sum cash payment equal to the value of Employee's unvested shares of Halliburton Company restricted stock in accordance with the table below and based on the closing price quoted for Halliburton Company common stock on the New York Stock Exchange on the date of Employee's termination of employment or the last business day immediately preceding the date of Employee's termination of employment, with such payment, if due Employee, to be paid on the sixtieth (60th) calendar day following the first anniversary of Employee's termination of employment. (For example, if Employee holds 50,000 shares of unvested restricted stock on the date of termination of employment, has at least five (5) years of service, but less than seven (7) years of service, and the closing price of Halliburton Company common stock on that date is \$40 per share, the value for purposes of calculating the amount of the payment in this (ii) would be equal to [(50,000 shares X 0.50) X \$40 per share] or [25,000 shares X \$40 per share] or \$1,000,000.) *All remaining shares will be forfeited.*

Consecutive Years of Service	Vested Percentage
Less than two years	0%
At least two, but less than five years	25%
At least five, but less than seven years	50%
At least seven, but less than ten years	75%
Ten or more years	100%

- (iii) Employee understands and agrees that his right to all or any portion of the payment provided for in Section 3.4(ii), and Employer's obligation to make payment of the entire amount or any portion thereof, are dependent and conditioned on Employee's compliance in full with all provisions contained in Article 5. Any failure on the part of Employee to comply with each provision, including any attempt by or on behalf of Employee to have any such provision declared unenforceable in whole or in part by an arbitrator or court, shall excuse Employer forever from the obligation to make the payment, in whole or in part, provided for in Section 3.4(ii).

3.5 (a) The benefits paid to Employee pursuant to Section 3.4(i) shall be in consideration of Employee's continuing obligations hereunder after such termination, including, without limitation, Employee's obligations under Article 4. Further, as a condition to the receipt of such benefits, Employer, in its sole discretion, shall require Employee to first execute a release, in the form established by Employer, releasing Employer and all other Halliburton Entities, and their officers, directors, employees, and agents, from any and all claims and from any and all causes of action of any kind or character, including, but not limited to, all claims and causes of action arising out of Employee's employment with Employer and any other Halliburton Entities or the termination of such employment. The release must be executed by Employee within a period designated by Employer, which shall begin no earlier than the date of Employee's termination.

of employment and will end no later than the date that is fifty (50) calendar days after the date of Employee's termination of employment. The performance of Employer's obligations under Section 3.4(i) and the receipt of the benefits provided thereunder by Employee shall constitute full settlement of all such claims and causes of action. Such release shall also include the restrictions contained in Sections 3.6 - 3.9. Employee shall not be under any duty or obligation to seek or accept other employment following a termination of employment pursuant to which a benefit payment under Section 3.4(i) is owing and the amounts due Employee pursuant to Section 3.4(i) shall not be reduced or suspended if Employee accepts subsequent employment or earns any amounts as a self-employed individual. Employee's rights under Section 3.4(i) are Employee's sole and exclusive rights against the Employer or its affiliates and the Employer's sole and exclusive liability to Employee under this Agreement, in contract, tort, under statute or otherwise, for the termination of his employment relationship with Employer.

(b) Employee agrees that all disputes relating to Employee's termination of employment, including, without limitation, any dispute as to the occurrence of the events listed in Section 3.2, and any claims or demands against Employer based upon Employee's employment for any monies other than those specified in Section 3.4(i), shall be resolved through the Halliburton Company Dispute Resolution Plan ("**Dispute Resolution Plan**") as provided in Section 6.6 hereof, provided, however, that decisions as to whether any of the events listed in Section 3.2 have occurred, will be made by the Board of Directors, the Compensation Committee, or its delegate, as required under the applicable Company policy, and in any dispute by Employee with any such determination, the arbitrator's decision shall be limited to whether the Board of Directors, the Compensation Committee, or its delegate, reached such decision in good faith. Nothing contained in this Article 3 shall be construed to be a waiver by Employee of any benefits accrued for or due Employee under any employee benefit plan (as such term is defined in the Employee Retirement Income Security Act of 1974, as amended) maintained by Employer except that Employee shall not be entitled to any severance benefits pursuant to any severance plan or program of the Employer.

3.6 In consideration of the access to the confidential information contained in Article 4, Employee agrees that, for a period of one (1) year following separation of employment, the Employee will not directly or indirectly (a) solicit, induce to terminate or reduce its business, or (b) agree to provide products and/or services that compete directly with the material products and services provided, marketed, and/or under development by the Employer at any time during the three (3) years preceding the Employee's separation from employment with Employer for any person or entity who paid or engaged Employer for products and/or services, or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings, while Employee was employed by Employer, during the three (3) years preceding the Employee's separation from employment with Employer. However, this restriction applies only to those products and/or services that the Employee was personally involved in.

3.7 Employee further agrees that Employee will not, during the one (1) year period following separation of employment, solicit, directly or indirectly, or cause or permit others to solicit, directly or indirectly, any person (i) formerly employed by Employer during the six (6) month period immediately preceding or following Employee's termination of employment ("**Former Employee**") or (ii) employed by Employer ("**Current Employee**"). The term "**solicit**" includes, but is not limited to, the following (regardless of whether done directly or indirectly): (a) requesting that a Former or Current Employee change employment, (b) informing a Former or Current Employee that an opening exists elsewhere, (c) assisting a Former or Current Employee in finding employment elsewhere, (d) inquiring if a Former or Current Employee "knows of anyone who might be interested" in a position elsewhere, (e) inquiring if a Former or Current Employee might have an interest in employment elsewhere, (f) informing others of the name or status of, or other information about, a Former or Current Employee, or (g) any other similar conduct, the intended or actual.

effect of which is that a Former Employee affiliates with another employer or a Current Employee leaves the employment of Employer

3.8 (a) In consideration of the access to confidential information and so as to enforce the confidentiality obligations contained in Article 4, the Employee specifically agrees that, for a period of one (1) year following separation of employment, except as permitted by Section 3.8(b) below, Employee will not engage, directly or indirectly, either as proprietor, stockholder, partner, officer, member, employee, consultant, or otherwise, in any existing or future business or in any existing or future division or unit of a commercially diverse business enterprise, that is owned in whole or in part or effectively controlled by any of the following companies

Baker Hughes Inc., Cameron International Corporation, Diamond Offshore Drilling, Inc., Ensco International, Inc., Exterran Holdings, Inc.; General Electric; Helmerich & Payne, Inc.; Nabors Industries, Ltd., National Oilwell Varco, Inc., Noble Corporation; Oceaneering International, Inc., Rowan Companies, Schlumberger Ltd., Tidewater Inc., Transocean, Ltd., Weatherford International, Ltd

(b) The above Section 3.8(a) notwithstanding, nothing in this Section 3.8 shall prohibit Employee and his affiliates from owning, as passive investors, in the aggregate not more than five percent of equity securities of any of the companies listed in such Section 3.8(a)

3.9 Termination of the employment relationship, regardless of reason or circumstances, does not terminate those obligations imposed by this Agreement which are continuing obligations, including, without limitation, Employee's obligations under Articles 3.6 - 3.9 and 4

ARTICLE 4: OWNERSHIP AND PROTECTION OF INTELLECTUAL PROPERTY AND CONFIDENTIAL INFORMATION:

4.1 All information, ideas, concepts, improvements, discoveries, works of authorship, and inventions, whether patentable or copyrightable or not, which are conceived, reduced to practice, authored, made, developed or acquired by Employee, individually or in conjunction with others, in the scope of Employee's employment by Employer or any of its affiliates, and/or during the term of Employee's employment (whether during business hours or otherwise and whether on Employer's premises or otherwise) which relate to the business, products or services of Employer or its affiliates (including, without limitation, all such information relating to any corporate opportunities, research, financial and sales data, pricing and trading terms, evaluations, opinions, interpretations, acquisition prospects, the identity of customers or their requirements, the identity of key contacts within the customer's organizations or within the organization of acquisition prospects, or marketing and merchandising techniques, prospective names, and marks), and all documents, things, writings and items of any type or in any media embodying any of the foregoing (collectively, "**Developments**"), and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks, shall be the sole and exclusive property of Employer or its affiliates, as the case may be. Employee hereby assigns to Employer any and all rights Employee might otherwise have in and to any such Developments, and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks

4.2 In connection with its employment of Employee, Employer shall provide to Employee such Confidential Information of Employer as is reasonably necessary for Employee to perform Employee's obligations hereunder. Employee agrees that "**Confidential Information**" as used herein shall include, without limitation, Employer's trade secrets, confidential information concerning the businesses of Employer and its affiliates, and their strategies, methods, products, software, books, records, data and technical

information concerning their products, equipment, services, and processes, procurement procedures and pricing techniques, and the names of and other information (such as credit and financial data) concerning their vendors, customers and business affiliates. Employee agrees that such Confidential Information constitutes valuable, special, and unique assets which Employer or its affiliates use in their business to obtain a competitive advantage over their competitors. Employee further agrees that protection of such Confidential Information against unauthorized disclosure and use is of critical importance to Employer and its affiliates in maintaining their competitive position. Employee shall not, at any time during or after the term of employment, use or disclose any Confidential Information of Employer or its affiliates, except to the extent needed to carry out Employee's obligations hereunder. Confidential Information shall not include information in the public domain (but only if the same becomes part of the public domain through a means other than a use or disclosure prohibited hereunder). The above notwithstanding, a disclosure shall not be unauthorized to the extent (i) it is required by law or by a court of competent jurisdiction or (ii) it is required in connection with any judicial, arbitration, dispute resolution or other legal proceeding in which Employee's legal rights and obligations as an employee or under this Agreement are at issue, provided, however, that Employee shall, to the extent practicable and lawful in any such event, give prior notice to Employer of Employee's intent to disclose any such confidential business information in such context so as to allow Employer or its affiliates an opportunity (which Employee will not oppose) to obtain such protective orders or similar relief with respect thereto as may be deemed appropriate, and that Employee shall limit any such disclosure to that required by the foregoing circumstances.

4.3 All written and electronic materials, records, and other documents and information made by, or coming into the possession of, Employee during the term of Employee's employment that contain or disclose any Confidential Information of Employer or its affiliates, and any and all proprietary rights of any kind thereto, including without limitation all rights relating to patents, copyrights, trade secrets, and trademarks, shall be and remain the sole and exclusive property of Employer, or its affiliates, as the case may be. Upon termination of Employee's employment for any reason, Employee promptly shall deliver the same, and all copies thereof, to Employer.

4.4 For purposes of this Article 4, "*affiliates*" shall mean entities in which Employer has a 20% or more direct or indirect equity interest.

ARTICLE 5: POST-EMPLOYMENT COVENANTS

5.1 In consideration of the access to the Confidential Information (as described in Article 4) provided by Employer, and in consideration of the payment made under Section 3.4(n) to protect Employer's Confidential Information, and the goodwill, customer base, and contractual relationships of Employer, Employee agrees to the provisions of Sections 5.2, 5.3 and 5.4. Employee further agrees that the provisions in Sections 5.2, 5.3 and 5.4, and the provisions in Article 4, shall survive the termination of Employee's employment regardless of the reason for or circumstances of such termination (and regardless of whether such termination of employment is voluntary or involuntary on Employee's part).

5.2 Employee agrees that, for a period of one (1) year following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, directly or indirectly, either (a) solicit, encourage, or induce to terminate or reduce its business with Employer, any person or entity who paid or engaged Employer for products and/or services, or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings while Employee was employed by Employer, during the three (3) years preceding the termination of Employee's employment, or (b) provide any products and/or services, that compete directly with products and/or services provided, marketed, and/or under development by Employer at any time during the three (3) years preceding the termination of Employee's employment, to any person or entity who paid or engaged Employer for products and/or services.

or who received the benefit of Employer's products and/or services, or with whom the Employee had any substantial dealings while Employee was employed by Employer, during the three (3) years preceding the termination of Employee's employment, provided, however, that the foregoing restrictions in Section 5 2(b) apply only to those products and/or services of Employer with respect to which the Employee was directly involved or knowledgeable

5.3 Employee further agrees that, for a period of one (1) year following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, solicit, directly or indirectly, or cause or permit others to solicit, directly or indirectly, any Former or Current Employee. The term "*solicit*" as used in this Section 5.3 shall have the same meaning provided for such term in Section 3 7 above

5 4 Employee further agrees that, for a period of one (1) year following the termination of Employee's employment for any reason, Employee shall not, anywhere in the world, engage, directly or indirectly, either as proprietor, stockholder, partner, officer, member, employee, consultant, or otherwise, in any business, or in any division or unit of a commercially diverse business enterprise listed in Section 3 8(a) above, except as qualified by Section 3 8(b) above

5.5 Employee agrees that (a) the covenants contained in Sections 5.2, 5 3 and 5 4 hereof are necessary for the protection of Employer's business, goodwill and Confidential Information, and (b) the compensation and other consideration received by Employee, including access to Confidential Information, are based on the parties' agreement to such covenants. Employee represents and warrants that the time, scope of activity and geographic area restricted by Sections 5 2, 5.3 and 5.4 are reasonable, especially in view of the worldwide scope of the business operations of Employer and the nature of the Confidential Information, that the enforcement of those restrictions contained in Sections 5 2, 5.3 and 5 4 would not be unduly burdensome to or impose any undue hardship on Employee, and that Employee will be able to earn a reasonable living while abiding by such covenants. Employee agrees that the restraints and provisions of Sections 5 2, 5 3 and 5 4 are no greater than necessary, and are as narrowly drafted as reasonably possible, to protect the legitimate interests of Employer, including the Confidential Information of Employer, including without limitation its trade secrets. Employee irrevocably waives all defenses to the strict enforcement of the covenants contained in Sections 5 2, 5.3 and 5 4, and agrees that the breach or violation, or threat thereof, of the obligations and covenants set forth in any of such Sections shall entitle Employer, as a matter of right, to an injunction without the requirement of a bond, restraining any further or continued breach or violation of said obligations and covenants. The parties agree and acknowledge that the nature of Employer's business, including the locations of its projects, vendors, customers, and potential customers, is global in nature. Accordingly, the parties expressly agree that the foregoing restrictions on Employee need to be global in territorial scope to adequately protect Employer's Confidential Information and goodwill, and that such global territorial restriction is reasonable in view of Employer's business, Employee's position and responsibilities with Employer, and Employee's access to the Confidential Information of Employer. If the scope of any restriction contained in Sections 5 2, 5 3 or 5 4 is deemed by a court to be broader than reasonable, which the parties agree should not be the case, then such restriction shall be enforced to the maximum extent permitted by law, and Employee and Employer hereby agree that such scope may be judicially modified accordingly in any proceeding brought to enforce such restriction

5.6 Employee agrees that the terms and conditions of this Agreement shall remain confidential as between the parties and he shall not disclose them to any other person. Without limiting the generality of the foregoing, Employee will not respond to or in any way participate in or contribute to any public discussion, notice or other publicity concerning, or in any way relating to, execution of this Agreement or its terms and conditions. Employee further agrees that he shall not make, directly or indirectly, whether in writing, orally or electronically, any negative, derogatory or other comment that could reasonably be expected to be

detrimental to the Halliburton Entities, their business or operations or any of their current or former employees, officers or directors. The foregoing notwithstanding, Employee may disclose the terms of this Agreement to his immediate family, attorneys and financial advisors provided he informs them of this confidentiality provision and they agree to abide by it.

ARTICLE 6: MISCELLANEOUS:

6.1 Except as otherwise provided in Section 4.4 hereof, for purposes of this Agreement, the terms "*affiliate*" or "*affiliated*" means an entity who directly, or indirectly through one or more intermediaries, controls, is controlled by, or is under common control with a Halliburton Entity or in which a Halliburton Entity has a 50% or more equity interest.

6.2 For purposes of this Agreement, notices and all other communications provided for herein shall be in writing and shall be deemed to have been duly given when received by or tendered to Employee or Employer, as applicable, by pre-paid courier or by United States registered or certified mail, return receipt requested, postage prepaid, addressed as follows:

If to Employer, to Halliburton Company at 3000 North Sam Houston Parkway East, Houston, Texas 77032, to the attention of the General Counsel, or to such other address as Employee shall receive notice thereof.

If to Employee, to his last known personal residence.

6.3 This Agreement shall be governed by and construed and enforced, in all respects in accordance with the law of the State of Texas, without regard to principles of conflicts of law, unless preempted by federal law, in which case federal law shall govern, provided, however, that the Dispute Resolution Plan and the Federal Arbitration Act shall govern in all respects with regard to the resolution of disputes hereunder. Employee and Employer further agree that any lawsuit, arbitration, or other proceeding arising out of or related in any way to this Agreement or their relationship shall be commenced and maintained only in the federal or state courts or before an arbitrator in Harris County, Texas, and each party waives any current or future objection to such venue and hereby further agrees to submit to the jurisdiction of any duly authorized court or arbitrator in Harris County, Texas with respect to any such proceeding.

6.4 No failure by either party hereto at any time to give notice of any breach by the other party of, or to require compliance with, any condition or provision of this Agreement shall be deemed a waiver of similar or dissimilar provisions or conditions at the same or at any prior or subsequent time.

6.5 It is a desire and intent of the parties that the terms, provisions, covenants, and remedies contained in this Agreement shall be enforceable to the fullest extent permitted by law. If any such term, provision, covenant, or remedy of this Agreement or the application thereof to any person, association, or entity or circumstances shall, to any extent, be construed to be invalid or unenforceable in whole or in part, then such term, provision, covenant, or remedy shall be construed in a manner so as to permit its enforceability under the applicable law to the fullest extent permitted by law. In any case, the remaining provisions of this Agreement or the application thereof to any person, association, or entity or circumstances other than those to which they have been held invalid or unenforceable, shall remain in full force and effect.

6.6 It is the mutual intention of the parties to have any dispute concerning this Agreement resolved out of court. Accordingly, the parties agree that any such dispute shall, as the sole and exclusive remedy, be submitted for resolution through the Dispute Resolution Plan; provided, however, that the Employer, on its own behalf and on behalf of any of the Halliburton Entities, shall be entitled to seek a restraining order or

injunction in any court of competent jurisdiction to prevent any breach or the continuation of any breach of the provisions of Articles 3 6 through 3 9, 4 and/or 5 pending initiation or completion of proceedings under the Dispute Resolution Plan Employee hereby consents that such restraining order or injunction may be granted without the necessity of the Employer posting any bond The parties agree that the resolution of any such dispute through such plan shall be final and binding. A copy of the Dispute Resolution Plan, as currently in effect, has been made available to Employee and is available on Halworld under "DRP" located at <http://halworld.corp.halliburton.com> Halliburton Company reserves the right to amend, or discontinue such plan, in accordance with, and subject to, the plan's provisions regarding same By signing this Agreement, Employee hereby represents and warrants that he has read, understood and agrees to the terms and conditions contained in such Dispute Resolution Plan. **THE PARTIES ACKNOWLEDGE THAT, BY SIGNING THIS AGREEMENT, THEY ARE KNOWINGLY AND VOLUNTARILY WAIVING ANY RIGHT THAT THEY MAY HAVE TO A JURY TRIAL.**

6.7 This Agreement shall be binding upon and inure to the benefit of Employer, to the extent herein provided, Halliburton Entity and any other person, association, or entity which may hereafter acquire or succeed to all or substantially all of the business or assets of Employer by any means whether direct or indirect, by purchase, merger, consolidation, or otherwise Employee's rights and obligations under this Agreement are personal and such rights, benefits, and obligations of Employee shall not be voluntarily or involuntarily assigned, alienated, or transferred, whether by operation of law or otherwise, without the prior written consent of Employer, other than in the case of death or incompetence of Employee

6.8 This Agreement replaces and merges any previous agreements, understandings and discussions pertaining to the subject matter covered herein and therein. This Agreement constitutes the entire agreement of the parties with regard to the terms of Employee's employment, termination of employment and severance benefits, and contains all of the covenants, promises, representations, warranties, and agreements between the parties with respect to such matters. Each party to this Agreement acknowledges that no representation, inducement, promise, or agreement, oral or written, has been made by either party with respect to the foregoing matters which is not embodied herein, and that no agreement, statement, or promise relating to the employment of Employee by Employer that is not contained in this Agreement shall be valid or binding Any modification of this Agreement will be effective only if it is in writing and signed by each party whose rights hereunder are affected thereby, provided that any such modification must be authorized or approved by the Compensation Committee or its delegate, as appropriate

6.9 Notwithstanding any provision of the Agreement to the contrary, the following provisions shall apply for purposes of complying with Section 409A of the Internal Revenue Code and applicable Treasury authorities ("Section 409A")

- (i) If Employee is a "*specified employee*," as such term is defined in Section 409A, any payments or benefits that are deferred compensation under Section 409A and are payable or provided as a result of Employee's termination of employment shall be payable on the date that is the earlier of (a) the date that is six months and one day after Employee's termination, (b) the date of Employee's death, or (c) the date that otherwise complies with the requirements of Section 409A
- (ii) It is intended that the provisions of this Agreement satisfy the requirements of Section 409A and that the Agreement be operated in a manner consistent with such requirements to the extent applicable Therefore, the Employer and Employee agree to construe the provisions of the Plan in accordance with the requirements of Section 409A.

[SIGNATURE PAGE FOLLOWS]

*Signature Page to
Executive Agreement*

IN WITNESS WHEREOF, Employer and Employee have duly executed this Agreement in multiple originals to be effective on the Effective Date

HALLIBURTON COMPANY

By /s/ Lawrence J Pope
Name Lawrence J Pope

Title: Executive Vice President, Administration &
Chief Human Resources Officer

EMPLOYEE

/s/ Timothy McKeon
Name Timothy McKeon

Exhibit 12.1

HALLIBURTON COMPANY
Computation of Ratio of Earnings to Fixed Charges
(Unaudited)
(Millions of dollars except ratios)

	Year Ended December 31				
	2013	2012	2011	2010	2009
Earnings available for fixed charges:					
Income from continuing operations before income taxes	\$ 2 764	\$ 3 822	\$ 4 449	\$ 2 655	\$ 1 682
Add:					
Distributed earnings from equity in unconsolidated affiliates	19	4	13	13	17
Fixed charges	511	445	384	402	361
Subtotal	3 294	4 271	4 846	3 070	2 060
Less					
Equity in earnings of unconsolidated affiliates	9	14	20	20	16
Total earnings available for fixed charges	\$ 3 285	\$ 4 257	\$ 4 826	\$ 3 050	\$ 2 044
Fixed charges:					
Interest expense	\$ 339	\$ 305	\$ 268	\$ 308	\$ 297
Rental expense representative of interest	172	140	116	94	64
Total fixed charges	\$ 511	\$ 445	\$ 384	\$ 402	\$ 361
Ratio of earnings to fixed charges	6 4	9 6	12 6	7 6	5 7

Exhibit 21.1

HALLIBURTON COMPANY

Subsidiaries of the Registrant

December 31, 2013

<u>NAME OF COMPANY</u>	<u>STATE OR COUNTRY OF INCORPORATION</u>
Baroid International Trading, LLC	United States, Delaware
Halliburton (Barbados) Investments SRL	Barbados
Halliburton Affiliates, LLC	United States, Delaware
Halliburton Canada Corp	Canada, Alberta
Halliburton Canada Holdings B V	Netherlands
Halliburton Canada ULC	Canada, Alberta
Halliburton de Mexico, S de R L de C V	Mexico
Halliburton Energy Cayman Islands Limited II	Cayman Islands
Halliburton Energy Services Limited	United Kingdom, Scotland
Halliburton Energy Services, Inc	United States, Delaware
Halliburton Far East Pte Ltd	Singapore
Halliburton Global Affiliates Holdings B V	Netherlands
Halliburton Group Canada	Canada
Halliburton Holdings (No 3)	United Kingdom, Scotland
Halliburton International, Inc	United States, Delaware
Halliburton International Holdings	Bermuda
Halliburton Luxembourg Holdings S à r l	Luxembourg
Halliburton Luxembourg Intermediate S à r l	Luxembourg
Halliburton Manufacturing and Services Limited	United Kingdom, England & Wales
Halliburton Netherlands Holdings B V	Netherlands
Halliburton Netherlands Operations Cooperatie U A	Netherlands
Halliburton Norway Holdings C V	Netherlands
Halliburton Overseas Limited	Cayman Islands
Halliburton Partners Canada ULC	Canada, Alberta
Halliburton U S International Holdings, Inc	United States, Delaware
Halliburton Worldwide GmbH	Switzerland
HES Corporation	United States, Nevada
HES Holding, Inc	United States, Delaware
HESI Holdings B V	Netherlands
Kellogg Energy Services, Inc	United States, Delaware
Landmark Graphics Corporation	United States, Delaware
Oilfield Telecommunications, LLC	United States, Delaware

Consent of Independent Registered Public Accounting Firm

The Board of Directors
Halliburton Company

We consent to the incorporation by reference in the registration statements (No. 333-177811) on Form S-3, (No. 333-166656) on Form S-4, and (Nos. 333-76496, 333-159394, 333-162648, 333-182284, and 333-188674) on Form S-8 of Halliburton Company of our reports dated February 7, 2014 with respect to the consolidated balance sheets of Halliburton Company as of December 31, 2013 and 2012, and the related consolidated statements of operations, shareholders' equity, comprehensive income, and cash flows for each of the years in the three-year period ended December 31, 2013, and the effectiveness of internal control over financial reporting as of December 31, 2013, which reports appear in the December 31, 2013 Annual Report on Form 10-K of Halliburton Company.

/s/ KPMG LLP
Houston, Texas
February 7, 2014

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J. Lesar, Mark A. McCollum and Christina M. Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014.

/s/ Alan M. Bennett
Alan M. Bennett

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ James R Boyd
James R Boyd

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ Milton Carroll
Milton Carroll

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J. Lesar, Mark A. McCollum and Christina M. Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014.

/s/ Nance K. Dicciani
Nance K. Dicciani

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith; and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ Murry S. Gerber
Murry S. Gerber

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ José C Grubisich
José C Grubisich

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ Abdallah S Jum'ah
Abdallah S Jum'ah

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J Lesar, Mark A McCollum and Christina M Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ Robert A. Malone
Robert A. Malone

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J. Lesar, Mark A. McCollum and Christina M. Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof.

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014.

/s/ J. Landis Martin
J. Landis Martin

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that I, the undersigned, a Director of Halliburton Company, do hereby constitute and appoint David J. Lesar, Mark A. McCollum and Christina M. Ibrahim, or any of them acting alone, my true and lawful attorneys or attorney, to do any and all acts and things and execute any and all instruments which said attorneys or attorney may deem necessary or advisable to enable Halliburton Company to comply with the Securities Exchange Act of 1934, as amended, and all rules, regulations and requirements of the Securities and Exchange Commission in respect thereof, in connection with the filing of the Annual Report on Form 10-K for the year ended December 31, 2013 (the "Form 10-K"), including specifically, but without limitation thereof, power and authority to sign my name as Director of Halliburton Company to the Form 10-K and any and all amendments thereto, and to any instruments or documents filed as a part of or in connection therewith, and I hereby ratify and confirm all that said attorneys or attorney shall do or cause to be done by virtue hereof

IN TESTIMONY WHEREOF, witness my hand this 6th day of January, 2014

/s/ Debra L. Reed
Debra L. Reed

Exhibit 31.1

Section 302 Certification

I, David J. Lesar, certify that

- 1 I have reviewed this annual report on Form 10-K for the year 2013 of Halliburton Company.
- 2 Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report.
- 3 Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report.
- 4 The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared.
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation, and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting, and
- 5 The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions)
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information, and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting

Date: February 7, 2014

/s/ David J. Lesar
David J. Lesar
Chief Executive Officer
Halliburton Company

Exhibit 31.2

Section 302 Certification

I, Mark A. McCollum, certify that

- 1 I have reviewed this annual report on Form 10-K for the year 2013 of Halliburton Company.
- 2 Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report.
- 3 Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report.
- 4 The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have
- (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared.
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles.
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation, and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting, and
- 5 The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions)
- (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information, and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting

Date: February 7, 2014

/s/ Mark A. McCollum
Mark A. McCollum
Chief Financial Officer
Halliburton Company

Exhibit 32.1

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

This certification is provided pursuant to § 906 of the Sarbanes-Oxley Act of 2002, 18 U.S.C. § 1350, and accompanies the Annual Report on Form 10-K for the period ended December 31, 2013 of Halliburton Company (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report")

I, David J. Lesar, Chief Executive Officer of the Company, certify that

- (1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company

/s/ David J. Lesar

David J. Lesar
Chief Executive Officer

Date February 7, 2014

Exhibit 32.2

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

This certification is provided pursuant to § 906 of the Sarbanes-Oxley Act of 2002, 18 U S C § 1350, and accompanies the Annual Report on Form 10-K for the period ended December 31, 2013 of Halliburton Company (the "Company") as filed with the Securities and Exchange Commission on the date hereof (the "Report")

I, Mark A. McCollum, Chief Financial Officer of the Company, certify that

- (1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company

/s/ Mark A. McCollum
Mark A. McCollum
Chief Financial Officer

Date February 7, 2014

Exhibit 95

Mine Safety Disclosures

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act, each operator of a mine is required to include certain mine safety results in its periodic reports filed with the SEC. The operation of our mines is subject to regulation by the federal Mine Safety and Health Administration (MSHA) under the Federal Mine Safety and Health Act of 1977 (Mine Act). Below, we present the following items regarding certain mining safety and health matters for the year ended December 31, 2013:

- total number of violations of mandatory health or safety standards that could significantly and substantially contribute to the cause and effect of a mine safety or health hazard under section 104 of the Mine Act for which we have received a citation from MSHA,
- total number of orders issued under section 104(b) of the Mine Act, which covers violations that had previously been cited under section 104(a) that, upon follow-up inspection by MSHA, are found not to have been totally abated within the prescribed time period, which results in the issuance of an order requiring the mine operator to immediately withdraw all persons (except certain authorized persons) from the mine,
- total number of citations and orders for unwarrantable failure of the mine operator to comply with mandatory health or safety standards under Section 104(d) of the Mine Act
- total number of flagrant violations (i.e., reckless or repeated failure to make reasonable efforts to eliminate a known violation of a mandatory health or safety standard that substantially and proximately caused, or reasonably could have been expected to cause, death or serious bodily injury) under section 110(b)(2) of the Mine Act,
- total number of imminent danger orders (i.e., the existence of any condition or practice in a mine which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated) issued under section 107(a) of the Mine Act,
- total dollar value of proposed assessments from MSHA under the Mine Act,
- total number of mining-related fatalities; and
- total number of pending legal actions before the Federal Mine Safety and Health Review Commission involving such mine

HALLIBURTON COMPANY
Mine Safety Disclosures
Year Ended December 31, 2013:
(Unaudited)
(Whole dollars)

Operational MSHA Identification Number ⁽¹⁾	Section 104 Citations	Section 104(b) Orders	104(d) Citations and Orders	Section 110(b)(2) Violations	Section 107(a) Orders	Proposed MSHA Assessments ⁽²⁾	Fatalities	Pending Legal Actions
BPM Colony Mill/4800070	2					5	1,660	
BPM Colony Mine/4800889								
BPM Lovell Mill/4801405	2						1,236	
BPM Lovell Mine/4801016								
Corpus Christi Grinding Plant/4104010								
Dunphy Mill/2600412	1				1		4,400	
Lake Charles Plant/1601032								
Luroco Grinding Plant/1601504								
Roscoe Jig Plant/2602239								
Total	5				1	5	7,296	

(1) The definition of a mine under section 3 of the Mine Act includes the mine, as well as other items used in, or to be used in, or resulting from the work of extracting minerals, such as land, structures, facilities, equipment, machines, tools, and preparation facilities. Unless otherwise indicated, any of these other items associated with a single mine have been aggregated in the totals for that mine.

(2) Amounts included are the total dollar value of proposed or outstanding assessments received from MSHA on or before January 6, 2014 regardless of whether the assessment has been challenged or appealed, for citations and orders occurring during the year ended December 31, 2013.

In addition, as required by the reporting requirements regarding mine safety included in §1503(a)(2) of the Dodd-Frank Act, the following is a list for the year ended December 31, 2013, of each mine of which we or a subsidiary of ours is an operator, that has received written notice from MSHA of

(a) a pattern of violations of mandatory health or safety standards that are of such nature as could have significantly and substantially contributed to the cause and effect of mine health or safety hazards under §104(e) of the Mine Act

None, or

(b) the potential to have such a pattern

None

Citations and orders can be contested and appealed, and as part of that process, are sometimes reduced in severity and amount, and are sometimes dismissed. The number of citations, orders, and proposed assessments vary by inspector and also vary depending on the size and type of the operation.



B



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Pace Analytical Services, Inc
1638 Roseytown Road - Suites 2,3,4
Greensburg, PA 15601
(724)850-5600

August 02, 2014

Chase Ertzberger
CTEH
5120 North Shore Drive
North Little Rock, AR 72118

RE: Project 106393 Statoil @ Hannibal, OH
Pace Project No.. 30125991

Dear Chase Ertzberger

Enclosed are the analytical results for sample(s) received by the laboratory on July 29, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Rachel Christner
rachel.christner@pacelabs.com
Project Manager

Enclosures

cc Mr. Scott Kluska, CTEH
CTEH Lab Results, CTEH
K. Scribner, CTEH
Mr. Robert Wilkinson, CTEH
gico@statoil.com, CTEH



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CERTIFICATIONS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601
ACCLASS DOD-ELAP Accreditation # ADE-1544
Alabama Certification # 41590
Arizona Certification # AZ0734
Arkansas Certification
California/TNI Certification # 04222CA
Colorado Certification
Connecticut Certification # PH-0694
Delaware Certification
Florida/TNI Certification # E87683
Guam/PADEP Certification
Hawaii/PADEP Certification
Idaho Certification
Illinois/PADEP Certification
Indiana/PADEP Certification
Iowa Certification # 391
Kansas/TNI Certification # E-10358
Kentucky Certification # 90133
Louisiana DHH/TNI Certification # LA140008
Louisiana DEQ/TNI Certification # 4086
Maine Certification # PA00091
Maryland Certification # 308
Massachusetts Certification # M-PA1457
Michigan/PADEP Certification
Missouri Certification # 235

Montana Certification # Cert 0082
Nebraska Certification # NE-05-29-14
Nevada Certification
New Hampshire/TNI Certification # 2976
New Jersey/TNI Certification # PA 051
New Mexico Certification
New York/TNI Certification # 10888
North Carolina Certification # 42706
North Dakota Certification # R-190
Oregon/TNI Certification # PA200002
Pennsylvania/TNI Certification # 65-00282
Puerto Rico Certification # PA01457
South Dakota Certification
Tennessee Certification # TN2867
Texas/TNI Certification # T104704188
Utah/TNI Certification # PA014572014-4
Vermont Dept of Health ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification # 460198
Washington Certification # C868
West Virginia DEP Certification # 143
West Virginia DHHR Certification # 9964C
Wisconsin/PADEP Certification
Wyoming Certification # 8TMS-Q

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS65 Lab ID: 30125991001 Collected 07/28/14 10 20 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	ND mg/kg		490	1	07/30/14 10 52	07/31/14 13 00	7440-23-5	
8270 MSSV TCLP Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311, 07/30/14 20 40 Initial pH 9 28, Final pH 6 29								
1,4-Dichlorobenzene	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 11	106-46-7	
2,4-Dinitrotoluene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 11	121-14-2	
Hexachloro-1,3-butadiene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 11	87-68-3	
Hexachlorobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 11	118-74-1	
Hexachloroethane	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 11	67-72-1	
2-Methylphenol(o-Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 11	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 11		
Nitrobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 11	98-95-3	
Pentachlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 11	87-86-5	
Pyridine	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 11	110-86-1	
2,4,5-Trichlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 11	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 11	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	52 %		35-114	1	07/31/14 16 15	08/01/14 14 11	4165-60-0	
2-Fluorobiphenyl (S)	47 %		43-116	1	07/31/14 16 15	08/01/14 14 11	321-60-8	
Terphenyl-d14 (S)	41 %		33-141	1	07/31/14 16 15	08/01/14 14 11	1718-51-0	
Phenol-d6 (S)	55 %		10-110	1	07/31/14 16 15	08/01/14 14 11	13127-88-3	
2-Fluorophenol (S)	57 %		21-110	1	07/31/14 16 15	08/01/14 14 11	367-12-4	
2,4,6-Tribromophenol (S)	56 %		10-123	1	07/31/14 16 15	08/01/14 14 11	118-79-6	
8260 MSV TCLP Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND ug/L		50 0	1		08/01/14 23 19	71-43-2	
2-Butanone (MEK)	ND ug/L		5000	1		08/01/14 23 19	78-93-3	
Carbon tetrachloride	ND ug/L		50 0	1		08/01/14 23 19	56-23-5	
Chlorobenzene	ND ug/L		1000	1		08/01/14 23 19	108-90-7	
Chloroform	ND ug/L		500	1		08/01/14 23 19	67-66-3	
1,2-Dichloroethane	ND ug/L		50 0	1		08/01/14 23 19	107-06-2	
1,1-Dichloroethene	ND ug/L		50 0	1		08/01/14 23 19	75-35-4	
Tetrachloroethene	ND ug/L		50 0	1		08/01/14 23 19	127-18-4	
Trichloroethene	ND ug/L		50 0	1		08/01/14 23 19	79-01-6	
Vinyl chloride	ND ug/L		50 0	1		08/01/14 23 19	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	104 %		70-130	1		08/01/14 23 19	17060-07-0	
Toluene-d8 (S)	98 %		70-130	1		08/01/14 23 19	2037-28-5	
4-Bromofluorobenzene (S)	97 %		70-130	1		08/01/14 23 19	480-00-4	
Percent Moisture Analytical Method ASTM D2974-87								
Percent Moisture	20.2 %		0 10	1		07/31/14 22 34		
1010 Flashpoint,Closed Cup Analytical Method EPA 1010								
Flashpoint	>200 deg F		60 0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS65 Lab ID: 30125991001 Collected 07/28/14 10 20 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	7.9 Std	Units	1 0	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	ND	mg/kg	0 75	1		07/31/14 21 39	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	1 3	1		07/29/14 19 00		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	12 5	1		07/29/14 19 00		

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ANALYTICAL RESULTS

Project 106393 Statoli @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS66 Lab ID: 30125991002 Collected 07/28/14 10 30 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP								
Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	1520 mg/kg		777	1	07/30/14 10 52	07/31/14 13 02	7440-23-5	
8270 MSSV TCLP								
Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311, 07/30/14 20 40 Initial pH 9 01, Final pH 6 83								
1,4-Dichlorobenzene	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 31	106-46-7	
2,4-Dinitrotoluene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 31	121-14-2	
Hexachloro-1,3-butadiene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 31	87-68-3	
Hexachlorobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 31	118-74-1	
Hexachloroethane	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 31	67-72-1	
2-Methylphenol(o-Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 31	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 31		
Nitrobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 31	98-95-3	
Pentachlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 31	87-86-5	
Pyridine	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 31	110-86-1	
2,4,5-Trichlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 31	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 31	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	49 %		35-114	1	07/31/14 16 15	08/01/14 14 31	4165-60-0	
2-Fluorobiphenyl (S)	44 %		43-116	1	07/31/14 16 15	08/01/14 14 31	321-60-8	
Terphenyl-d14 (S)	2 %		33-141	1	07/31/14 16 15	08/01/14 14 31	1718-51-0	S6
Phenol-d6 (S)	54 %		10-110	1	07/31/14 16 15	08/01/14 14 31	13127-88-3	
2-Fluorophenol (S)	55 %		21-110	1	07/31/14 16 15	08/01/14 14 31	367-12-4	
2,4,6-Tribromophenol (S)	41 %		10-123	1	07/31/14 16 15	08/01/14 14 31	118-79-6	
8260 MSV TCLP								
Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND ug/L		50 0	1		08/01/14 23 44	71-43-2	
2-Butanone (MEK)	ND ug/L		5000	1		08/01/14 23 44	78-93-3	
Carbon tetrachloride	ND ug/L		50 0	1		08/01/14 23 44	56-23-5	
Chlorobenzene	ND ug/L		1000	1		08/01/14 23 44	108-90-7	
Chloroform	ND ug/L		500	1		08/01/14 23 44	67-66-3	
1,2-Dichloroethane	ND ug/L		50 0	1		08/01/14 23 44	107-06-2	
1,1-Dichloroethene	ND ug/L		50 0	1		08/01/14 23 44	75-35-4	
Tetrachloroethene	ND ug/L		50 0	1		08/01/14 23 44	127-18-4	
Trichloroethene	ND ug/L		50 0	1		08/01/14 23 44	79-01-6	
Vinyl chloride	ND ug/L		50 0	1		08/01/14 23 44	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	105 %		70-130	1		08/01/14 23 44	17060-07-0	
Toluene-d8 (S)	100 %		70-130	1		08/01/14 23 44	2037-26-5	
4-Bromofluorobenzene (S)	94 %		70-130	1		08/01/14 23 44	480-00-4	
Percent Moisture								
Analytical Method ASTM D2974-87								
Percent Moisture	53.4 %		0 10	1		07/31/14 22 36		
1010 Flashpoint,Closed Cup								
Analytical Method EPA 1010								
Flashpoint	>200 deg F		60 0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS66 Lab ID: 30125991002 Collected 07/28/14 10 30 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	8.7	Std Units	10	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	ND	mg/kg	13	1		07/31/14 21 43	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	21	1		07/29/14 19 00		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	214	1		07/29/14 19 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS67 Lab ID: 30125991003 Collected 07/28/14 10 45 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	698 mg/kg		419	1	07/30/14 10 52	07/31/14 13 09	7440-23-5	
8270 MSSV TCLP Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311, 07/30/14 20 40 Initial pH 9 64, Final pH 6 88								
1,4-Dichlorobenzene	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 51	106-46-7	
2,4-Dinitrotoluene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 51	121-14-2	
Hexachloro-1,3-butadiene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 51	87-68-3	
Hexachlorobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 51	118-74-1	
Hexachloroethane	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 51	67-72-1	
2-Methylphenol(o-Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 51	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 14 51		
Nitrobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 51	98-95-3	
Pentachlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 51	87-86-5	
Pyridine	ND ug/L		500	1	07/31/14 16 15	08/01/14 14 51	110-86-1	
2,4,5-Trichlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 14 51	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		100	1	07/31/14 16 15	08/01/14 14 51	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	59 %		35-114	1	07/31/14 16 15	08/01/14 14 51	4165-60-0	
2-Fluorobiphenyl (S)	48 %		43-116	1	07/31/14 16 15	08/01/14 14 51	321-60-8	
Terphenyl-d14 (S)	44 %		33-141	1	07/31/14 16 15	08/01/14 14 51	1718-51-0	
Phenol-d6 (S)	62 %		10-110	1	07/31/14 16 15	08/01/14 14 51	13127-88-3	
2-Fluorophenol (S)	61 %		21-110	1	07/31/14 16 15	08/01/14 14 51	367-12-4	
2,4,6-Tribromophenol (S)	58 %		10-123	1	07/31/14 16 15	08/01/14 14 51	118-79-6	
8260 MSV TCLP Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND ug/L		50 0	1		08/02/14 00 08	71-43-2	
2-Butanone (MEK)	ND ug/L		5000	1		08/02/14 00 08	78-93-3	
Carbon tetrachloride	ND ug/L		50 0	1		08/02/14 00 08	56-23-5	
Chlorobenzene	ND ug/L		1000	1		08/02/14 00 08	108-90-7	
Chloroform	ND ug/L		500	1		08/02/14 00 08	67-66-3	
1,2-Dichloroethane	ND ug/L		50 0	1		08/02/14 00 08	107-06-2	
1,1-Dichloroethene	ND ug/L		50 0	1		08/02/14 00 08	75-35-4	
Tetrachloroethene	ND ug/L		50 0	1		08/02/14 00 08	127-18-4	
Trichloroethene	ND ug/L		50 0	1		08/02/14 00 08	79-01-6	
Vinyl chloride	ND ug/L		50 0	1		08/02/14 00 08	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	105 %		70-130	1		08/02/14 00 08	17060-07-0	
Toluene-d8 (S)	101 %		70-130	1		08/02/14 00 08	2037-26-5	
4-Bromofluorobenzene (S)	99 %		70-130	1		08/02/14 00 08	460-00-4	
Percent Moisture Analytical Method ASTM D2974-87								
Percent Moisture	6.9 %		0 10	1		07/31/14 22 37		
1010 Flashpoint,Closed Cup Analytical Method EPA 1010								
Flashpoint	>200 deg F		60 0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS67 Lab ID. 30125991003 Collected 07/28/14 10 45 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	8.7	Std Units	1.0	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	ND	mg/kg	0.59	1		07/31/14 21 43	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	1.1	1		07/29/14 19 00		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	10.7	1		07/29/14 19 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS68 Lab ID: 30125991004 Collected 07/28/14 11 55 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP								
Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	1180	mg/kg	417	1	07/30/14 10 52	07/31/14 13 12	7440-23-5	
8270 MSSV TCLP								
Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311, 07/30/14 20 40 Initial pH 9 68, Final pH 6 98								
1,4-Dichlorobenzene	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 11	106-46-7	
2,4-Dinitrotoluene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 11	121-14-2	
Hexachloro-1,3-butadiene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 11	87-68-3	
Hexachlorobenzene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 11	118-74-1	
Hexachloroethane	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 11	67-72-1	
2-Methylphenol(o-Cresol)	ND	ug/L	2000	1	07/31/14 16 15	08/01/14 15 11	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/L	2000	1	07/31/14 16 15	08/01/14 15 11		
Nitrobenzene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 11	98-95-3	
Pentachlorophenol	ND	ug/L	5000	1	07/31/14 16 15	08/01/14 15 11	87-86-5	
Pyridine	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 11	110-86-1	
2,4,5-Trichlorophenol	ND	ug/L	5000	1	07/31/14 16 15	08/01/14 15 11	95-95-4	
2,4,6-Trichlorophenol	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 11	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	61 %		35-114	1	07/31/14 16 15	08/01/14 15 11	4165-60-0	
2-Fluorobiphenyl (S)	50 %		43-116	1	07/31/14 16 15	08/01/14 15 11	321-60-8	
Terphenyl-d14 (S)	41 %		33-141	1	07/31/14 16 15	08/01/14 15 11	1718-51-0	
Phenol-d6 (S)	65 %		10-110	1	07/31/14 16 15	08/01/14 15 11	13127-88-3	
2-Fluorophenol (S)	66 %		21-110	1	07/31/14 16 15	08/01/14 15 11	367-12-4	
2,4,6-Tribromophenol (S)	64 %		10-123	1	07/31/14 16 15	08/01/14 15 11	118-79-6	
8260 MSV TCLP								
Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND	ug/L	50 0	1		08/02/14 00 33	71-43-2	
2-Butanone (MEK)	ND	ug/L	5000	1		08/02/14 00 33	78-93-3	
Carbon tetrachloride	ND	ug/L	50 0	1		08/02/14 00 33	56-23-5	
Chlorobenzene	ND	ug/L	1000	1		08/02/14 00 33	108-90-7	
Chloroform	ND	ug/L	500	1		08/02/14 00 33	67-66-3	
1,2-Dichloroethane	ND	ug/L	50 0	1		08/02/14 00 33	107-06-2	
1,1-Dichloroethene	ND	ug/L	50 0	1		08/02/14 00 33	75-35-4	
Tetrachloroethene	ND	ug/L	50 0	1		08/02/14 00 33	127-18-4	
Trichloroethene	ND	ug/L	50 0	1		08/02/14 00 33	79-01-6	
Vinyl chloride	ND	ug/L	50 0	1		08/02/14 00 33	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	105 %		70-130	1		08/02/14 00 33	17060-07-0	
Toluene-d8 (S)	102 %		70-130	1		08/02/14 00 33	2037-26-5	
4-Bromofluorobenzene (S)	102 %		70-130	1		08/02/14 00 33	460-00-4	
Percent Moisture								
Analytical Method ASTM D2974-87								
Percent Moisture	10.4 %		0 10	1		07/31/14 22 38		
1010 Flashpoint,Closed Cup								
Analytical Method EPA 1010								
Flashpoint	>200	deg F	60 0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS68 Lab ID: 30125991004 Collected 07/28/14 11 55 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	9.1	Std Units	1 0	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	1.4	mg/kg	0 54	1		07/31/14 21 46	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	1 1	1		07/31/14 22 21		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	11 2	1		07/31/14 15 00		

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ANALYTICAL RESULTS

Project 106393 Statoli @ Hannibal, OH

Pace Project No 30125991

Sample: HAOH0728SS69 Lab ID: 30125991005 Collected 07/28/14 12 10 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP								
Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	ND	mg/kg	357	1	07/30/14 10 52	07/31/14 13 15	7440-23-5	
8270 MSSV TCLP								
Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311, 07/30/14 20 40 Initial pH 9.35, Final pH 6.82								
1,4-Dichlorobenzene	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 31	106-46-7	
2,4-Dinitrotoluene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 31	121-14-2	
Hexachloro-1,3-butadiene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 31	87-68-3	
Hexachlorobenzene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 31	118-74-1	
Hexachloroethane	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 31	67-72-1	
2-Methylphenol(o-Cresol)	ND	ug/L	2000	1	07/31/14 16 15	08/01/14 15 31	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND	ug/L	2000	1	07/31/14 16 15	08/01/14 15 31		
Nitrobenzene	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 31	98-95-3	
Pentachlorophenol	ND	ug/L	5000	1	07/31/14 16 15	08/01/14 15 31	87-86-5	
Pyridine	ND	ug/L	500	1	07/31/14 16 15	08/01/14 15 31	110-86-1	
2,4,5-Trichlorophenol	ND	ug/L	5000	1	07/31/14 16 15	08/01/14 15 31	95-95-4	
2,4,6-Trichlorophenol	ND	ug/L	100	1	07/31/14 16 15	08/01/14 15 31	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	70 %		35-114	1	07/31/14 16 15	08/01/14 15 31	4165-60-0	
2-Fluorobiphenyl (S)	60 %		43-116	1	07/31/14 16 15	08/01/14 15 31	321-60-8	
Terphenyl-d14 (S)	46 %		33-141	1	07/31/14 16 15	08/01/14 15 31	1718-51-0	
Phenol-d6 (S)	75 %		10-110	1	07/31/14 16 15	08/01/14 15 31	13127-88-3	
2-Fluorophenol (S)	75 %		21-110	1	07/31/14 16 15	08/01/14 15 31	367-12-4	
2,4,6-Tribromophenol (S)	74 %		10-123	1	07/31/14 16 15	08/01/14 15 31	118-79-6	
8260 MSV TCLP								
Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND	ug/L	50.0	1		08/02/14 00 57	71-43-2	
2-Butanone (MEK)	ND	ug/L	5000	1		08/02/14 00 57	78-93-3	
Carbon tetrachloride	ND	ug/L	50.0	1		08/02/14 00 57	56-23-5	
Chlorobenzene	ND	ug/L	1000	1		08/02/14 00 57	108-90-7	
Chloroform	ND	ug/L	500	1		08/02/14 00 57	67-66-3	
1,2-Dichloroethane	ND	ug/L	50.0	1		08/02/14 00 57	107-06-2	
1,1-Dichloroethene	ND	ug/L	50.0	1		08/02/14 00 57	75-35-4	
Tetrachloroethene	ND	ug/L	50.0	1		08/02/14 00 57	127-18-4	
Trichloroethene	ND	ug/L	50.0	1		08/02/14 00 57	79-01-6	
Vinyl chloride	ND	ug/L	50.0	1		08/02/14 00 57	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	109 %		70-130	1		08/02/14 00 57	17060-07-0	
Toluene-d8 (S)	98 %		70-130	1		08/02/14 00 57	2037-26-5	
4-Bromofluorobenzene (S)	94 %		70-130	1		08/02/14 00 57	460-00-4	
Percent Moisture								
Analytical Method ASTM D2974-87								
Percent Moisture	4.1 %		0.10	1		07/31/14 22 40		
1010 Flashpoint,Closed Cup								
Analytical Method EPA 1010								
Flashpoint	>200 deg F		60.0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS69 Lab ID: 30125991005 Collected 07/28/14 12 10 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	8.2	Std Units	1.0	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	ND	mg/kg	0.52	1		07/31/14 21 46	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	1.0	1		07/31/14 22 21		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	10.4	1		07/31/14 15 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS70 Lab ID: 30125991008 Collected 07/28/14 12 20 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
6010 MET ICP								
Analytical Method EPA 6010B Preparation Method EPA 3050B								
Sodium	ND mg/kg		467	1	07/30/14 10 52	07/31/14 13 17	7440-23-5	
8270 MSSV TCLP								
Analytical Method EPA 8270C Preparation Method EPA 3535A								
Leachate Method/Date EPA 1311 07/30/14 20 40 Initial pH 9 18, Final pH 6 67								
1,4-Dichlorobenzene	ND ug/L		500	1	07/31/14 16 15	08/01/14 15 51	106-46-7	
2,4-Dinitrotoluene	ND ug/L		100	1	07/31/14 16 15	08/01/14 15 51	121-14-2	
Hexachloro-1,3-butadiene	ND ug/L		100	1	07/31/14 16 15	08/01/14 15 51	87-68-3	
Hexachlorobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 15 51	118-74-1	
Hexachloroethane	ND ug/L		500	1	07/31/14 16 15	08/01/14 15 51	67-72-1	
2-Methylphenol(o-Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 15 51	95-48-7	
3&4-Methylphenol(m&p Cresol)	ND ug/L		2000	1	07/31/14 16 15	08/01/14 15 51		
Nitrobenzene	ND ug/L		100	1	07/31/14 16 15	08/01/14 15 51	98-95-3	
Pentachlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 15 51	87-86-5	
Pyridine	ND ug/L		500	1	07/31/14 16 15	08/01/14 15 51	110-86-1	
2,4,5-Trichlorophenol	ND ug/L		5000	1	07/31/14 16 15	08/01/14 15 51	95-95-4	
2,4,6-Trichlorophenol	ND ug/L		100	1	07/31/14 16 15	08/01/14 15 51	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	62 %		35-114	1	07/31/14 16 15	08/01/14 15 51	4165-60-0	
2-Fluorobiphenyl (S)	52 %		43-116	1	07/31/14 16 15	08/01/14 15 51	321-60-8	
Terphenyl-d14 (S)	26 %		33-141	1	07/31/14 16 15	08/01/14 15 51	1718-51-0	S6
Phenol-d6 (S)	64 %		10-110	1	07/31/14 16 15	08/01/14 15 51	13127-88-3	
2-Fluorophenol (S)	65 %		21-110	1	07/31/14 16 15	08/01/14 15 51	367-12-4	
2,4,6-Tribromophenol (S)	61 %		10-123	1	07/31/14 16 15	08/01/14 15 51	118-79-6	
8260 MSV TCLP								
Analytical Method EPA 8260B Leachate Method/Date EPA 1311, 07/31/14 23 15								
Benzene	ND ug/L		50 0	1		08/02/14 01 21	71-43-2	
2-Butanone (MEK)	ND ug/L		5000	1		08/02/14 01 21	78-93-3	
Carbon tetrachloride	ND ug/L		50 0	1		08/02/14 01 21	56-23-5	
Chlorobenzene	ND ug/L		1000	1		08/02/14 01 21	108-90-7	
Chloroform	ND ug/L		500	1		08/02/14 01 21	67-66-3	
1,2-Dichloroethane	ND ug/L		50 0	1		08/02/14 01 21	107-06-2	
1,1-Dichloroethene	ND ug/L		50 0	1		08/02/14 01 21	75-35-4	
Tetrachloroethene	ND ug/L		50 0	1		08/02/14 01 21	127-18-4	
Trichloroethene	ND ug/L		50 0	1		08/02/14 01 21	79-01-6	
Vinyl chloride	ND ug/L		50 0	1		08/02/14 01 21	75-01-4	
Surrogates								
1,2-Dichloroethane-d4 (S)	105 %		70-130	1		08/02/14 01 21	17060-07-0	
Toluene-d8 (S)	101 %		70-130	1		08/02/14 01 21	2037-26-5	
4-Bromofluorobenzene (S)	99 %		70-130	1		08/02/14 01 21	460-00-4	
Percent Moisture								
Analytical Method ASTM D2974-87								
Percent Moisture	18.9 %		0 10	1		07/31/14 22 40		
1010 Flashpoint,Closed Cup								
Analytical Method EPA 1010								
Flashpoint	>200 deg F		60 0	1		07/30/14 17 00		

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ANALYTICAL RESULTS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Sample: HAOH0728SS70 Lab ID: 30125991006 Collected 07/28/14 12 20 Received 07/29/14 13 34 Matrix Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No	Qual
9045 pH Soil	Analytical Method EPA 9045C							
pH at 25 Degrees C	8.4	Std Units	10	1		07/29/14 23 42		
4500CNE Cyanide, Total	Analytical Method SM 4500-CN-E							
Cyanide	ND	mg/kg	0.59	1		07/31/14 21 51	57-12-5	
733C S Reactive Cyanide	Analytical Method SW-846 7 3 3 2							
Cyanide, Reactive	ND	mg/kg	1.2	1		07/31/14 22 24		
735S Reactive Sulfide	Analytical Method SW-846 7 3 4 2							
Sulfide, Reactive	ND	mg/kg	12.3	1		07/31/14 15 00		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch MPRP/13539 Analysis Method EPA 6010B
QC Batch Method EPA 3050B Analysis Description 6010 MET
Associated Lab Samples 30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006

METHOD BLANK 766361 Matrix Solid
Associated Lab Samples 30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sodium	mg/kg	ND	500	07/31/14 12 10	

LABORATORY CONTROL SAMPLE 766362

Parameter	Units	Spike Conc	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sodium	mg/kg	500	485J	97	80-120	

MATRIX SPIKE SAMPLE 766364

Parameter	Units	30125882001 Result	Spike Conc	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sodium	mg/kg	ND	449	366J	70	75-125	

SAMPLE DUPLICATE 766363

Parameter	Units	30125882001 Result	Dup Result	RPD	Qualifiers
Sodium	mg/kg	ND	59 8J		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	MSV/20520	Analysis Method	EPA 8260B
QC Batch Method	EPA 8260B	Analysis Description	8260 MSV TCLP
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

METHOD BLANK 767954

Matrix Water

Associated Lab Samples 30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1-Dichloroethene	ug/L	ND	50.0	08/01/14 22:55	
1,2-Dichloroethane	ug/L	ND	50.0	08/01/14 22:55	
2-Butanone (MEK)	ug/L	ND	5000	08/01/14 22:55	
Benzene	ug/L	ND	50.0	08/01/14 22:55	
Carbon tetrachloride	ug/L	ND	50.0	08/01/14 22:55	
Chlorobenzene	ug/L	ND	1000	08/01/14 22:55	
Chloroform	ug/L	ND	500	08/01/14 22:55	
Tetrachloroethene	ug/L	ND	50.0	08/01/14 22:55	
Trichloroethene	ug/L	ND	50.0	08/01/14 22:55	
Vinyl chloride	ug/L	ND	50.0	08/01/14 22:55	
1,2-Dichloroethane-d4 (S)	%	104	70-130	08/01/14 22:55	
4-Bromofluorobenzene (S)	%	99	70-130	08/01/14 22:55	
Toluene-d8 (S)	%	103	70-130	08/01/14 22:55	

LABORATORY CONTROL SAMPLE 767955

Parameter	Units	Spike Conc	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethene	ug/L	200	182	91	57-127	
1,2-Dichloroethane	ug/L	200	178	89	62-125	
2-Butanone (MEK)	ug/L	200	197J	98	48-136	
Benzene	ug/L	200	168	84	66-122	
Carbon tetrachloride	ug/L	200	182	91	55-126	
Chlorobenzene	ug/L	200	166J	83	70-121	
Chloroform	ug/L	200	172J	86	62-126	
Tetrachloroethene	ug/L	200	170	85	62-125	
Trichloroethene	ug/L	200	164	82	62-125	
Vinyl chloride	ug/L	200	192	96	52-145	
1,2-Dichloroethane-d4 (S)	%			101	70-130	
4-Bromofluorobenzene (S)	%			96	70-130	
Toluene-d8 (S)	%			100	70-130	

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	OEXT/20222	Analysis Method	EPA 8270C
QC Batch Method	EPA 3535A	Analysis Description	8270 TCLP MSSV
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

METHOD BLANK	767370	Matrix	Water
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,4-Dichlorobenzene	ug/L	ND	500	08/01/14 09 29	
2,4,5-Trichlorophenol	ug/L	ND	5000	08/01/14 09 29	
2,4,6-Trichlorophenol	ug/L	ND	100	08/01/14 09 29	
2,4-Dinitrotoluene	ug/L	ND	100	08/01/14 09 29	
2-Methylphenol(o-Cresol)	ug/L	ND	2000	08/01/14 09 29	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	2000	08/01/14 09 29	
Hexachloro-1,3-butadiene	ug/L	ND	100	08/01/14 09 29	
Hexachlorobenzene	ug/L	ND	100	08/01/14 09 29	
Hexachloroethane	ug/L	ND	500	08/01/14 09 29	
Nitrobenzene	ug/L	ND	100	08/01/14 09 29	
Pentachlorophenol	ug/L	ND	5000	08/01/14 09 29	
Pyridine	ug/L	ND	500	08/01/14 09 29	
2,4,6-Tribromophenol (S)	%	86	10-123	08/01/14 09 29	
2-Fluorobiphenyl (S)	%	76	43-116	08/01/14 09 29	
2-Fluorophenol (S)	%	88	21-110	08/01/14 09 29	
Nitrobenzene-d5 (S)	%	81	35-114	08/01/14 09 29	
Phenol-d6 (S)	%	86	10-110	08/01/14 09 29	
Terphenyl-d14 (S)	%	49	33-141	08/01/14 09 29	

METHOD BLANK	767374	Matrix	Water
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,4-Dichlorobenzene	ug/L	ND	500	08/01/14 12 50	
2,4,5-Trichlorophenol	ug/L	ND	5000	08/01/14 12 50	
2,4,6-Trichlorophenol	ug/L	ND	100	08/01/14 12 50	
2,4-Dinitrotoluene	ug/L	ND	100	08/01/14 12 50	
2-Methylphenol(o-Cresol)	ug/L	ND	2000	08/01/14 12 50	
3&4-Methylphenol(m&p Cresol)	ug/L	ND	2000	08/01/14 12 50	
Hexachloro-1,3-butadiene	ug/L	ND	100	08/01/14 12 50	
Hexachlorobenzene	ug/L	ND	100	08/01/14 12 50	
Hexachloroethane	ug/L	ND	500	08/01/14 12 50	
Nitrobenzene	ug/L	ND	100	08/01/14 12 50	
Pentachlorophenol	ug/L	ND	5000	08/01/14 12 50	
Pyridine	ug/L	ND	500	08/01/14 12 50	
2,4,6-Tribromophenol (S)	%	86	10-123	08/01/14 12 50	
2-Fluorobiphenyl (S)	%	68	43-116	08/01/14 12 50	
2-Fluorophenol (S)	%	90	21-110	08/01/14 12 50	
Nitrobenzene-d5 (S)	%	81	35-114	08/01/14 12 50	

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

METHOD BLANK 767374

Matrix Water

Associated Lab Samples 30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phenol-d6 (S)	%	91	10-110	08/01/14 12 50	
Terphenyl-d14 (S)	%	55	33-141	08/01/14 12 50	

LABORATORY CONTROL SAMPLE 767371

Parameter	Units	Spike Conc	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,4-Dichlorobenzene	ug/L	500	298J	60	25-108	
2,4,5-Trichlorophenol	ug/L	500	426J	85	49-130	
2,4,6-Trichlorophenol	ug/L	500	409	82	49-133	
2,4-Dinitrotoluene	ug/L	500	380	76	31-135	
2-Methylphenol(o-Cresol)	ug/L	500	406J	81	42-132	
3&4-Methylphenol(m&p Cresol)	ug/L	1000	842J	84	42-132	
Hexachloro-1,3-butadiene	ug/L	500	268	54	19-107	
Hexachlorobenzene	ug/L	500	260	52	21-105	
Hexachloroethane	ug/L	500	286J	57	21-105	
Nitrobenzene	ug/L	500	411	82	38-142	
Pentachlorophenol	ug/L	500	401J	80	32-139	
Pyridine	ug/L	500	85 1J	17	10-61	
2,4,6-Tribromophenol (S)	%			80	10-123	
2-Fluorobiphenyl (S)	%			65	43-116	
2-Fluorophenol (S)	%			80	21-110	
Nitrobenzene-d5 (S)	%			77	35-114	
Phenol-d6 (S)	%			77	10-110	
Terphenyl-d14 (S)	%			47	33-141	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE 767372

767373

Parameter	Units	30125967001 Result	MS Spike Conc	MSD Spike Conc	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
1,4-Dichlorobenzene	ug/L	ND	500	500	343J	303J	69	61	25-108		
2,4,5-Trichlorophenol	ug/L	ND	500	500	425J	354J	85	71	49-130		
2,4,6-Trichlorophenol	ug/L	ND	500	500	410	332	82	66	49-133	21	
2,4-Dinitrotoluene	ug/L	ND	500	500	393	320	79	64	31-135	20	
2-Methylphenol(o-Cresol)	ug/L	ND	500	500	420J	353J	84	71	42-132		
3&4-Methylphenol(m&p Cresol)	ug/L	ND	1000	1000	875J	716J	88	72	42-132		
Hexachloro-1,3-butadiene	ug/L	ND	500	500	306	281	61	56	19-107	9	
Hexachlorobenzene	ug/L	ND	500	500	222	190	44	38	21-105	15	
Hexachloroethane	ug/L	ND	500	500	335J	288J	67	58	21-105		
Nitrobenzene	ug/L	ND	500	500	400	343	80	69	38-142	15	
Pentachlorophenol	ug/L	ND	500	500	409J	341J	82	68	32-139		
Pyridine	ug/L	ND	500	500	230J	188J	46	38	10-61		
2,4,6-Tribromophenol (S)	%						82	64	10-123		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

MATRIX SPIKE & MATRIX SPIKE DUPLICATE			767372		767373		MS Spike Conc	MSD Spike Conc	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Parameter	Units	Result	30125967001	Result	30125967001	Result									
2-Fluorobiphenyl (S)	%										73	60	43-116		
2-Fluorophenol (S)	%										81	66	21-110		
Nitrobenzene-d5 (S)	%										79	61	35-114		
Phenol-d6 (S)	%										79	63	10-110		
Terphenyl-d14 (S)	%										43	34	33-141		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	PMST/4699	Analysis Method	ASTM D2974-87
QC Batch Method	ASTM D2974-87	Analysis Description	Dry Weight/Percent Moisture
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

SAMPLE DUPLICATE 767509

Parameter	Units	30125991001 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	20.2	22.3	10	

SAMPLE DUPLICATE 767510

Parameter	Units	30126093015 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	27.3	25.0	9	

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WET/24535	Analysis Method	EPA 1010
QC Batch Method	EPA 1010	Analysis Description	1010 Flash Point, Closed Cup
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

METHOD BLANK	766683	Matrix	Water
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Flashpoint	deg F	>200	60.0	07/30/14 17:00	

SAMPLE DUPLICATE 766684

Parameter	Units	30125197001 Result	Dup Result	RPD	Qualifiers
Flashpoint	deg F	121	121.2		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WET/24515	Analysis Method	EPA 9045C
QC Batch Method	EPA 9045C	Analysis Description	9045 pH
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

SAMPLE DUPLICATE 766169

Parameter	Units	30125991006 Result	Dup Result	RPD	Qualifiers
pH at 25 Degrees C	Std Units	8.4	8.4	0	

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WETA/17330	Analysis Method	SM 4500-CN-E
QC Batch Method	SM 4500-CN-E	Analysis Description	4500CNE Cyanide, Total
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

METHOD BLANK	767046	Matrix	Solid
Associated Lab Samples	30125991001, 30125991002, 30125991003, 30125991004, 30125991005, 30125991006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/kg	ND	0.57	07/31/14 21 38	

LABORATORY CONTROL SAMPLE 767047

Parameter	Units	Spike Conc	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/kg	5.7	5.8	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE 767048 767049

Parameter	Units	30125991001 Result	MS Spike Conc	MSD Spike Conc	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD		Qual
										22	M2	
Cyanide	mg/kg	ND	3	3.8	2.9	3.6	84	86	90-110	22	M2	

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WETA/17295	Analysis Method	SW-846 7 3 3 2
QC Batch Method	SW-846 7 3 3 2	Analysis Description	733C Reactive Cyanide
Associated Lab Samples	30125991001, 30125991002, 30125991003		

METHOD BLANK	765971	Matrix	Solid
Associated Lab Samples	30125991001, 30125991002, 30125991003		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide, Reactive	mg/kg	ND	0.99	07/29/14 19:00	

SAMPLE DUPLICATE 765972

Parameter	Units	30125629001 Result	Dup Result	RPD	Qualifiers
Cyanide, Reactive	mg/kg	ND	ND		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WETA/17329	Analysis Method	SW-846 7 3 3 2
QC Batch Method	SW-846 7 3 3 2	Analysis Description	733C Reactive Cyanide
Associated Lab Samples	30125991004, 30125991005, 30125991006		

METHOD BLANK 767044 Matrix Solid
Associated Lab Samples 30125991004, 30125991005, 30125991006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide, Reactive	mg/kg	ND	1 0	07/31/14 22 13	

SAMPLE DUPLICATE 767045

Parameter	Units	30126142001 Result	Dup Result	RPD	Qualifiers
Cyanide, Reactive	mg/kg	ND	ND		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WETA/17296	Analysis Method	SW-846 7 3 4 2
QC Batch Method	SW-846 7 3 4 2	Analysis Description	734S Reactive Sulfide
Associated Lab Samples	30125991001, 30125991002, 30125991003		

METHOD BLANK 765975 Matrix Solid
Associated Lab Samples 30125991001, 30125991002, 30125991003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide, Reactive	mg/kg	ND	99	07/29/14 19 00	

SAMPLE DUPLICATE 765976

Parameter	Units	30125629001 Result	Dup Result	RPD	Qualifiers
Sulfide, Reactive	mg/kg	ND	ND		

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QUALITY CONTROL DATA

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

QC Batch	WETA/17328	Analysis Method	SW-846 7 3 4 2
QC Batch Method	SW-846 7 3 4 2	Analysis Description	734S Reactive Sulfide
Associated Lab Samples	30125991004, 30125991005, 30125991006		

METHOD BLANK	767042	Matrix	Solid
Associated Lab Samples	30125991004, 30125991005, 30125991006		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide, Reactive	mg/kg	ND	10	07/31/14 15 00	

SAMPLE DUPLICATE 767043

Parameter	Units	30126142001 Result	Dup Result	RPD	Qualifiers
Sulfide, Reactive	mg/kg	ND	ND		

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QUALIFIERS

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content

ND - Not Detected at or above adjusted reporting limit

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit

MDL - Adjusted Method Detection Limit

PQL - Practical Quantitation Limit

RL - Reporting Limit

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270 The result reported for each analyte is a combined concentration

Pace Analytical is TNI accredited Contact your Pace PM for the current list of accredited analytes

TNI - The NELAC Institute

BATCH QUALIFIERS

Batch MSV/20520

[1] A matrix spike/matrix spike duplicate was not performed for this batch

ANALYTE QUALIFIERS

M2 Matrix spike recovery was below QC limits due to sample dilution Data acceptance based on laboratory control sample (LCS) recovery

S6 Surrogate recovery outside control limits Data accepted based on valid recovery of applicable surrogates (no analytes associated with this surrogate)

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30125991001	HAOH0728SS65	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991002	HAOH0728SS66	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991003	HAOH0728SS67	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991004	HAOH0728SS68	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991005	HAOH0728SS69	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991006	HAOH0728SS70	EPA 3050B	MPRP/13539	EPA 6010B	ICP/12837
30125991001	HAOH0728SS65	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991002	HAOH0728SS66	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991003	HAOH0728SS67	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991004	HAOH0728SS68	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991005	HAOH0728SS69	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991006	HAOH0728SS70	EPA 3535A	OEXT/20222	EPA 8270C	MSSV/6619
30125991001	HAOH0728SS65	EPA 8260B	MSV/20520		
30125991002	HAOH0728SS66	EPA 8260B	MSV/20520		
30125991003	HAOH0728SS67	EPA 8260B	MSV/20520		
30125991004	HAOH0728SS68	EPA 8260B	MSV/20520		
30125991005	HAOH0728SS69	EPA 8260B	MSV/20520		
30125991006	HAOH0728SS70	EPA 8260B	MSV/20520		
30125991001	HAOH0728SS65	ASTM D2974-87	PMST/4699		
30125991002	HAOH0728SS66	ASTM D2974-87	PMST/4699		
30125991003	HAOH0728SS67	ASTM D2974-87	PMST/4699		
30125991004	HAOH0728SS68	ASTM D2974-87	PMST/4699		
30125991005	HAOH0728SS69	ASTM D2974-87	PMST/4699		
30125991006	HAOH0728SS70	ASTM D2974-87	PMST/4699		
30125991001	HAOH0728SS65	EPA 1010	WET/24535		
30125991002	HAOH0728SS66	EPA 1010	WET/24535		
30125991003	HAOH0728SS67	EPA 1010	WET/24535		
30125991004	HAOH0728SS68	EPA 1010	WET/24535		
30125991005	HAOH0728SS69	EPA 1010	WET/24535		
30125991006	HAOH0728SS70	EPA 1010	WET/24535		
30125991001	HAOH0728SS65	EPA 9045C	WET/24515		
30125991002	HAOH0728SS66	EPA 9045C	WET/24515		
30125991003	HAOH0728SS67	EPA 9045C	WET/24515		
30125991004	HAOH0728SS68	EPA 9045C	WET/24515		
30125991005	HAOH0728SS69	EPA 9045C	WET/24515		
30125991006	HAOH0728SS70	EPA 9045C	WET/24515		
30125991001	HAOH0728SS65	SM 4500-CN-E	WETA/17330		
30125991002	HAOH0728SS66	SM 4500-CN-E	WETA/17330		
30125991003	HAOH0728SS67	SM 4500-CN-E	WETA/17330		
30125991004	HAOH0728SS68	SM 4500-CN-E	WETA/17330		
30125991005	HAOH0728SS69	SM 4500-CN-E	WETA/17330		
30125991006	HAOH0728SS70	SM 4500-CN-E	WETA/17330		
30125991001	HAOH0728SS65	SW-846 7 3 3 2	WETA/17295		
30125991002	HAOH0728SS66	SW-846 7 3 3 2	WETA/17295		
30125991003	HAOH0728SS67	SW-846 7 3 3 2	WETA/17295		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project 106393 Statoil @ Hannibal, OH
Pace Project No 30125991

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30125991004	HAOH0728SS68	SW-846 7 3 3 2	WETA/17329		
30125991005	HAOH0728SS69	SW-846 7 3 3 2	WETA/17329		
30125991006	HAOH0728SS70	SW-846 7 3 3 2	WETA/17329		
30125991001	HAOH0728SS65	SW-846 7 3 4 2	WETA/17296		
30125991002	HAOH0728SS66	SW-846 7 3 4 2	WETA/17296		
30125991003	HAOH0728SS67	SW-846 7 3 4 2	WETA/17296		
30125991004	HAOH0728SS68	SW-846 7 3 4 2	WETA/17328		
30125991005	HAOH0728SS69	SW-846 7 3 4 2	WETA/17328		
30125991006	HAOH0728SS70	SW-846 7 3 4 2	WETA/17328		

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**Sample Condition Upon Receipt**Client Name. CTEHProject # 30125991Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☒ Pace Other _____

Tracking #. _____

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact ☒ yes ☐ no Biological Tissue Is Frozen: Yes NoPacking Material: Bubble Wrap Bubble Bags None Other zipperThermometer Used 7 Type of Ice: Wet Blue None ☒ Samples on ice, cooling process has begunCooler Temp.: Observed Temp: 4.3 °C Correction Factor: -0.1 °C Final Temp. 4.2 °C

Temp should be above freezing to 8°C

Comments.

Date and Initials of person

examining contents: drml
7-21-14

Chain of Custody Present	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1
Chain of Custody Filled Out	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2
Chain of Custody Relinquished	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3
Sampler Name & Signature on COC	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4
Samples Arrived within Hold Time	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7
Sufficient Volume.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8
Correct Containers Used	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11
Sample Labels match COC	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12
-Includes date/time/ID/Analysis Matrix	<u>SI</u>	
All containers needing preservation have been checked	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13
All containers needing preservation are found to be in compliance with EPA recommendation	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
exceptions VOA, coliform, TOC, O&G, W-DRO (water)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed <u>AMH</u> Lot # of added preservative
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14
Headspace in VOA Vials (>6mm)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15
Trip Blank Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	16
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased)		

Client Notification/ Resolution:

Field Data Required?

Y / N

Person Contacted: _____ Date/Time _____

Comments/ Resolution _____

Project Manager Review: [Signature]Date: 7/30/14

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

HESI00162

Project Number: 30125991
Client Name: CTEH

Item No	001	006
Matrix Code	SL	SL
Glass Jar (120 / 250 / 500 / 1L)	Y	Y
Soil kit (2 SB, 1M, soil jar)		
Chemistry (250 / 500 / 1L)		
Organics (1L)		
Nutrient (250 / 500)		
Phenolics (250 ml)		
TOC (40 ml / 250 ml)		
TOX (250 ml)		
Total Metals		
Dissolved Metals preserved Y N		
O & G (1L)		
TPH (1L)		
VOA (40 ml 30 ml)		
Cyanide (250 ml)		
Sulfide (500 ml)		
Bacteria (120 ml)		
Wipes / swipe/ smear/ filter		
Radchem Nalgene (125 / 250 / 500 / 1L)		
Radchem Nalgene (1/2 gal / 1 gal L)		
Cubitainer (500 ml / 4L)		
Ziploc		
Other		
Other		



Well Pad Split Soil Sample Locations

Ohio Operations Incident



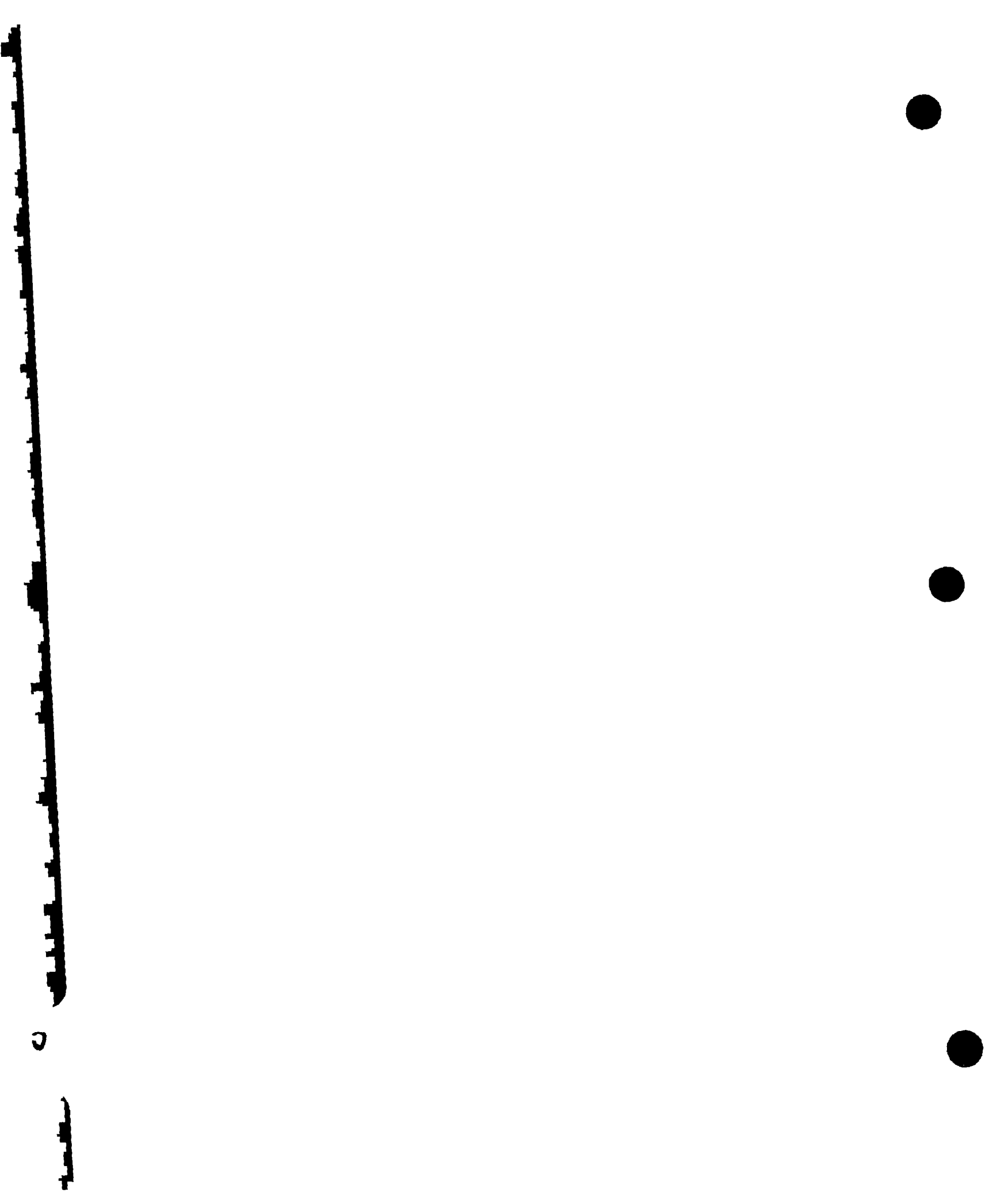
Project: 106393
Client: Statoil
City: Hannibal, OH
County: Monroe



PROJECTION SYSTEM: UTM Zone 17N COORDINATE SYSTEM: North American Datum 1983

Last Updated: 8/3/2014 11:00:10 AM

HESI00164





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GLOBAL HSE STANDARD				Halliburton Management System Category 10 Standard 11 ST-GL-HAL-HSE-1011		
Title: Spill Management						
Region: GLOBAL	Function/PSL: GLOBAL HSE					
Owner: Vice President, HSE & SQ	Approved By: Tom Knode	Job Revision By: Eric Kemp	Issue Date: 09-16-2009	Revision Date: 12-07-2013	Rev: 2	Page: 1 of 4

Objective

This document establishes requirements for management, reporting and investigating spills in order to prevent environmental damage, meet regulatory/customer requirements, minimize waste and to minimize legal and regulatory exposure

1.0 Application

This standard applies to all Halliburton locations and affected work activities worldwide

Where local/country regulations or customer requirements are more stringent than the Global HSE standards, the local/country regulations or customer requirements shall supersede the Halliburton Global HSE standards. Where local/country regulations or customer requirements provide additional requirements, the local/country regulations or customer requirements shall be supplemented to the Halliburton Global HSE standards.

2.0 Definitions

Spill –An unplanned release to the environment of any liquid, gas, or solid that adversely impacts, or has the potential to adversely impact, the soil, water, or our air in a manner other than its intended purpose or results in the loss of product or materials. Releases during transfer, transport, storage, or parking that result in the loss of chemicals or materials are to be considered spills. This includes releases occurring in containment and specifically includes all releases that exceed regulatory thresholds.

Qualified Person – A person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.

3.0 Responsibilities

3.1 HSE functional personnel are responsible for:

- 3.1.1 Assisting Management with communicating requirements of this standard and any additional governmental spill management regulations to employees in their area of responsibility.
- 3.1.2 Assisting Management to ensure their area of responsibility is in compliance with this standard.
- 3.1.3 Ensuring training meets the requirements of this standard
- 3.1.4 Assisting Management in development of work methods/processes that incorporate safety and environmental requirements of this standard.

3.2 Management is responsible for:

- 3.2.1 Communicating requirements of this standard to employees and contractors in their area of responsibility.
- 3.2.2 Identifying employees in their area of responsibility and ensuring they are Qualified Persons.

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23-Jan-14

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3.2.3 Developing work methods/processes that incorporate safety requirements of this standard and any additional governmental regulations.

3.2.4 Ensuring inspections of work areas occur on a consistent basis to identify key areas that may need to be addressed to mitigate spills

3.3 Employees are responsible for:

3.3.1 Completing training and reporting issues to their immediate supervisors.

4.0 Requirements

4.1 General

4.1.1 Spills are environmental incidents and must be reported into the HSE Incident Management System per Global HSE Standard, Incident Reporting/Recording (ST-GL-HAL-HSE-0108)

4.1.2 At a minimum, unless other more specific regulatory programs are applicable, all Halliburton facilities must address spill prevention and countermeasures in both their facility inspection procedures and in their Emergency Response Plans. Refer to Global HSE Standard, Emergency Response Plan (ST-GL-HAL-HSE-0601).

4.1.3 Each facility must maintain a list of all applicable regulatory reporting thresholds and reporting requirements, (e.g., agencies to report to and time limits for reporting). This relates to all chemicals and materials stored on Halliburton sites and used at job locations

4.2 Internal Spill Reporting

At a minimum, unless other more specific regulatory, internal standard or customer requirements are applicable, all spills of any liquid, solid or gas in excess of 1 U.S. gallon (4 liters, 004 cubic meters) must be reported as an environmental incident and recorded in the HSE Information Management System as per Global HSE Standard, Incident Reporting/Recording (ST-GL-HAL-HSE-0108)

4.3 External Spill Reporting

4.3.1 Local HSE personnel must review spilled volumes of chemicals and materials released and evaluate these against applicable reporting requirements

4.3.2 Spills that exceed local jurisdiction reporting thresholds must be reported to the local regulatory authorities in accordance with their requirements and time frames

4.3.3 In addition, spills that occur on job locations must meet customer requirements for reporting thresholds and notifications

4.3.4 Records of spill report notifications must be retained on file at the facility per applicable regulatory and Halliburton record retention requirements

4.3.5 Global HSE (Environmental Compliance) and the Environmental Law group must be advised in advance (via phone call or e-mail) or within 24 hours (if advance notification is not possible) of any spill reported externally to a regulatory authority or customer

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regardless of country or origin External reporting to a regulatory agency shall be conducted by Halliburton Global HSE (Environmental Compliance) or the Environmental Law group, or with pre-approval of one of these groups

4.4 Spill Response and Remediation

- 4.4.1 All spill response and remediation must be addressed appropriate to the type and quantity material spilled as quickly as possible and in compliance with regulatory requirements
- 4.4.2 Spill cleanup and response conducted by third -party contractors must be conducted by contractors approved in accordance with Global HSE requirements.

4.5 Spill Investigation

- 4.5.1 At a minimum all high potential and significant spill incidents, as per Global HSE Standard, Incident Investigation and Causal Analysis (ST-GL-HAL-HSE-0102) and Global HSE Standard, Incident Reporting/Recording (ST-GL-HAL-HSE-0108) must be followed by a complete incident investigation which is recorded with the incident. Other spill criteria may require an incident investigation as directed by Halliburton management

5.0 Training

5.1 Initial Training

- 5.1.1 Training for spill prevention and control must be completed as per the facility's Emergency Response Plan along with any applicable regulatory requirements. Refer to Global HSE Standard, Emergency Response Plan (ST-GL-HAL-HSE-0601). Managers are required to provide effective onboarding to include as part of initial training HSE awareness and notifying affected personnel of this standard as well as all other GHSE standards

5.2 Additional Training

Customer defined requirements if applicable

6.0 Recordkeeping

- 6.1 Records of spill response, regulatory notifications, remediation, corrective actions and required training must be maintained as required by regulatory and Halliburton record retention requirements
- 6.2 All HSE documents shall be retained and maintained per the Global HSE Standard, HSE Record Retention (ST-GL-HAL-HSE-1004).

Date Issued	Rev No	Summary of Key Revisions
02 APR 98	0	Published
16.SEP.09	1	

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07 DEC 13	2	Format and template updated, Application updated, Recordkeeping updated
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HESI00168

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*ENVIRONMENTAL
COMPLIANCE*

**ENVIRONMENTAL
NEW HIRE
AWARENESS**

**A GENERAL AWARENESS PROGRAM FOR
EVERY NEW HIRE EMPLOYEE**

EXAMPLE

- 5 GALLON PAIL OF DIESEL

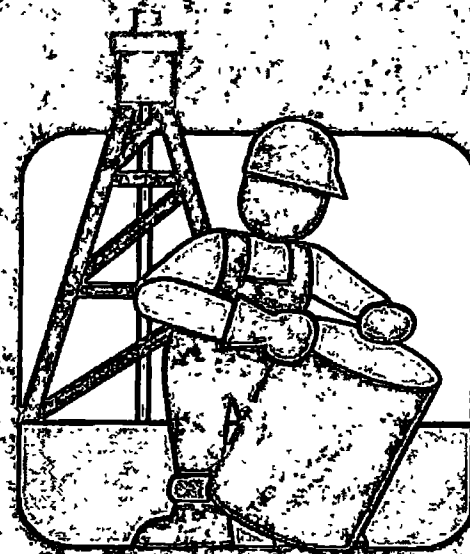
- ✦ WELL SITE

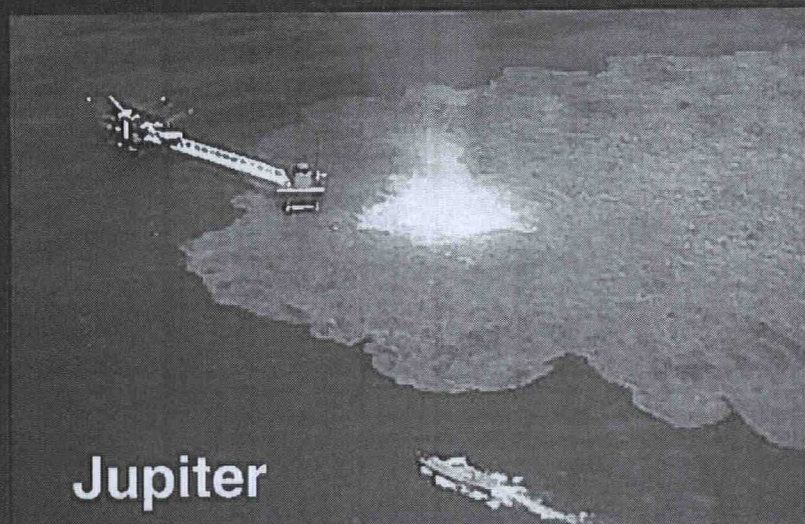
- ✦ INTO WATER

- ✦ McDONALD'S

OBJECTIVES

- Realize Halliburton's Potential Impact Upon the Environment
- Understand Your Role in Protecting the Environment
- Identify Solutions
- Proper Reporting

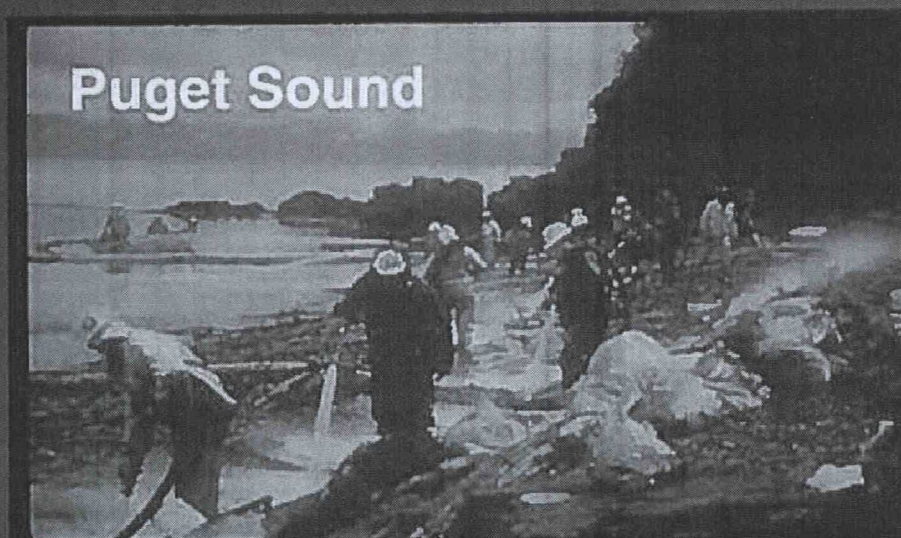




Jupiter



Kuwait



Puget Sound

ENVIRONMENTAL EXCELLENCE

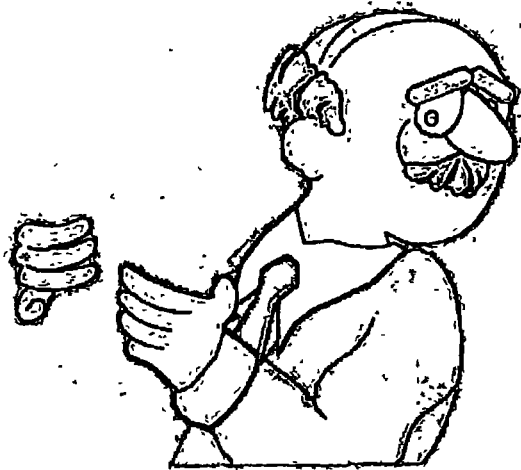
"Performing our job in a manner that protects the environment, leaving the environment in better condition than we found it, going above and beyond compliance with the law, and cleaning up after ourselves"



ACCOUNTABILITY

Company Expectations for Environmental
Excellence:

Every Employee



Clear Expectations

Consequences

HALLIBURTON VISION

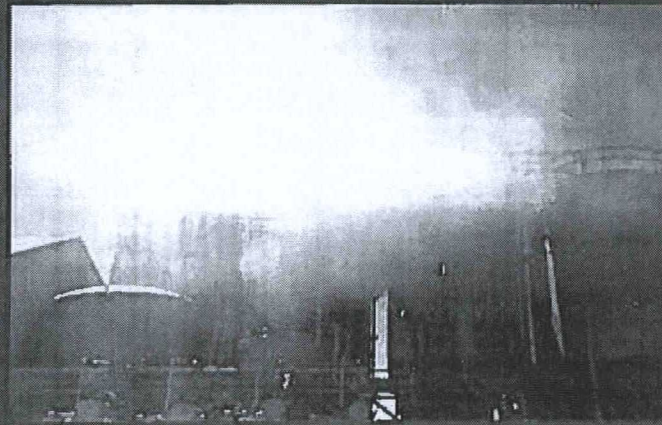
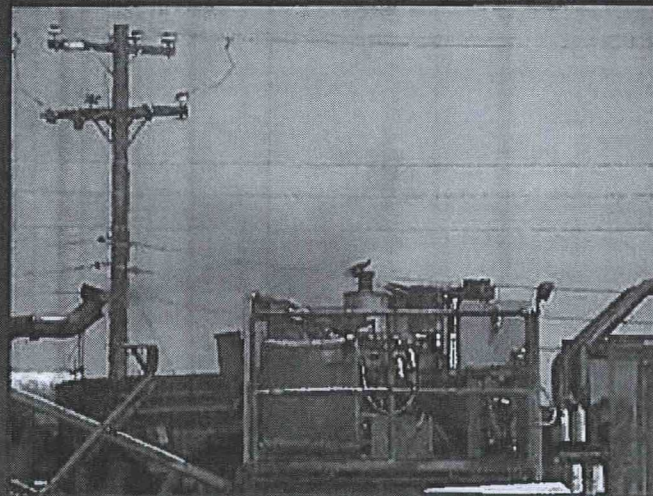
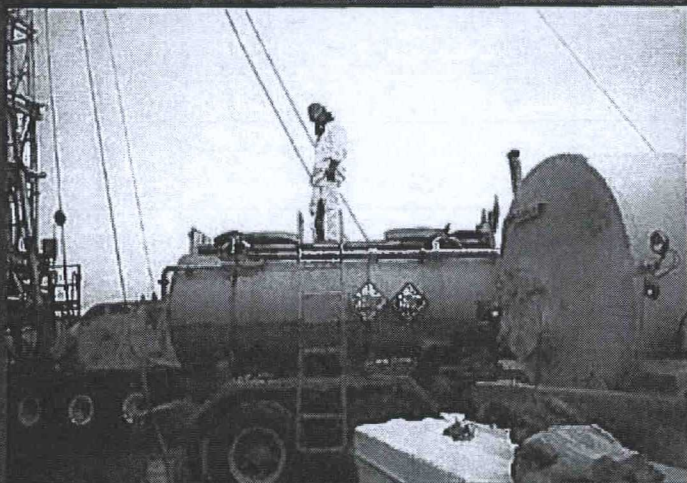
The Halliburton Business Code of Conduct

"All employees must conduct their duties and responsibilities in compliance with applicable laws and industry standards relating to health and safety in the workplace and protection of the environment."

DOES HALLIBURTON IMPACT THE ENVIRONMENT?

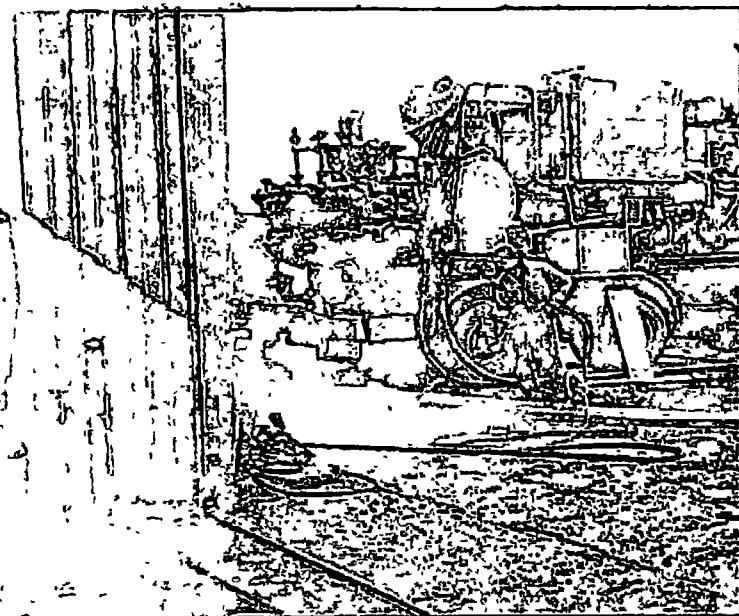
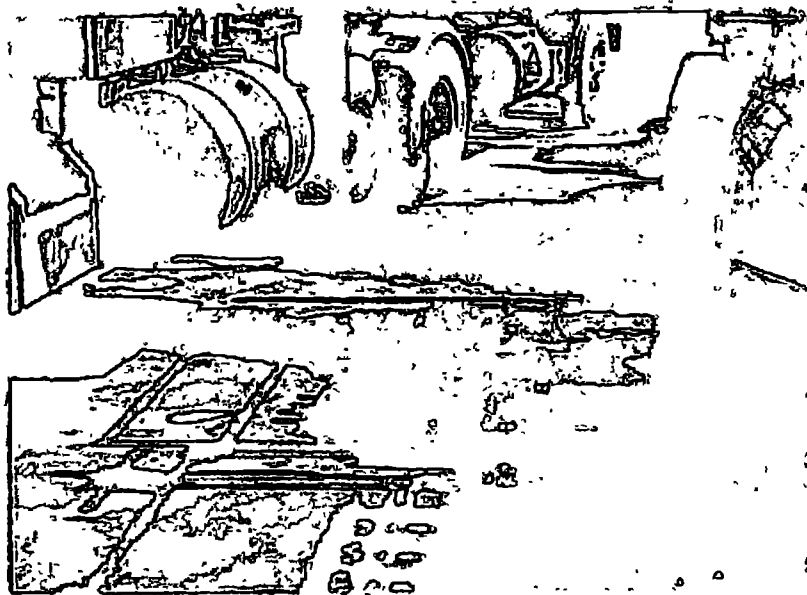


AIR POLLUTION

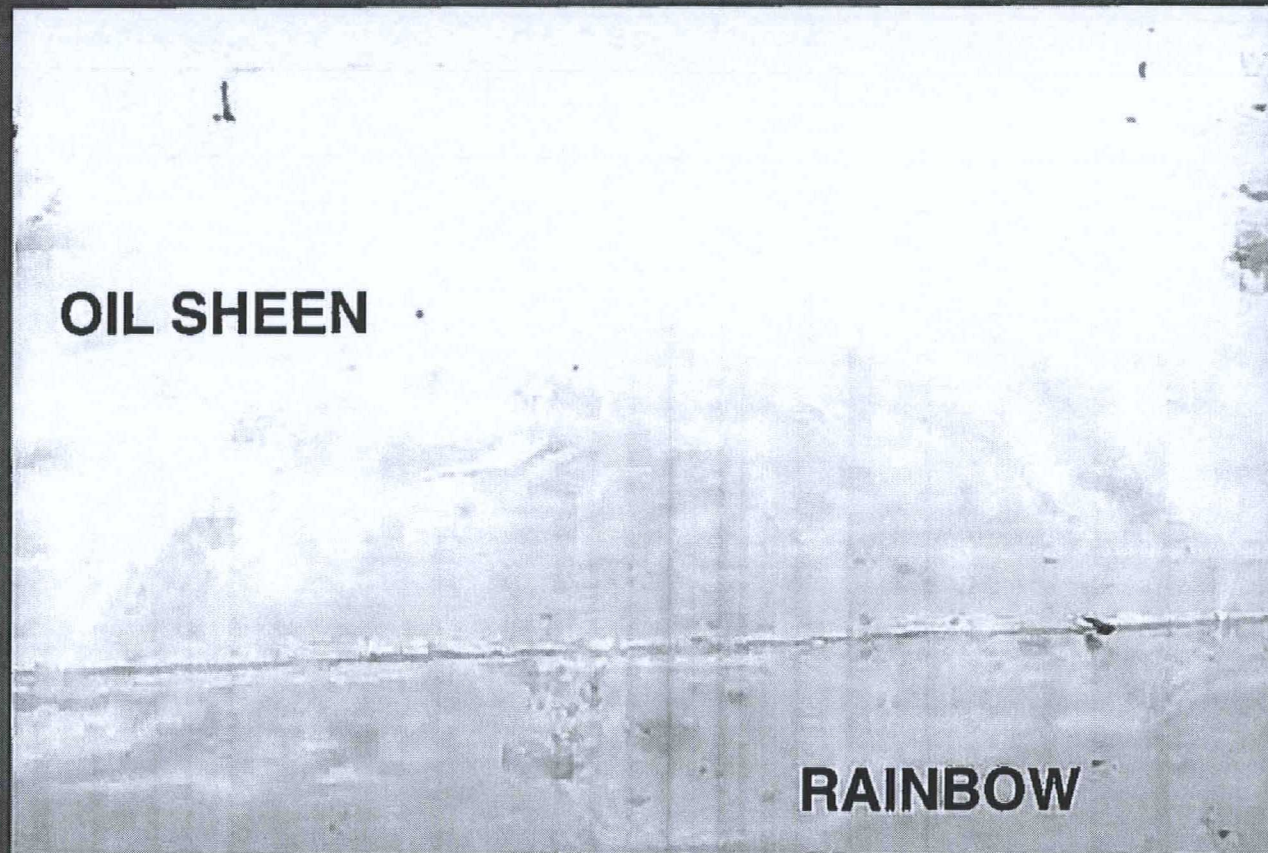


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SURFACE WATER POLLUTION

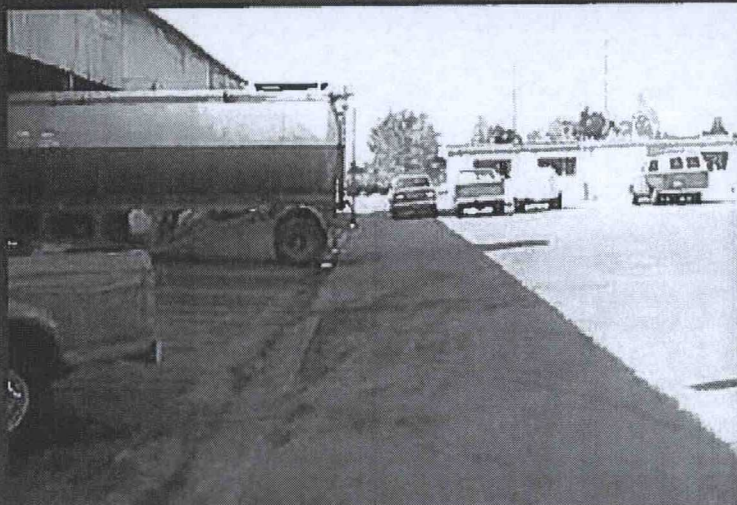


SURFACE WATER POLLUTION



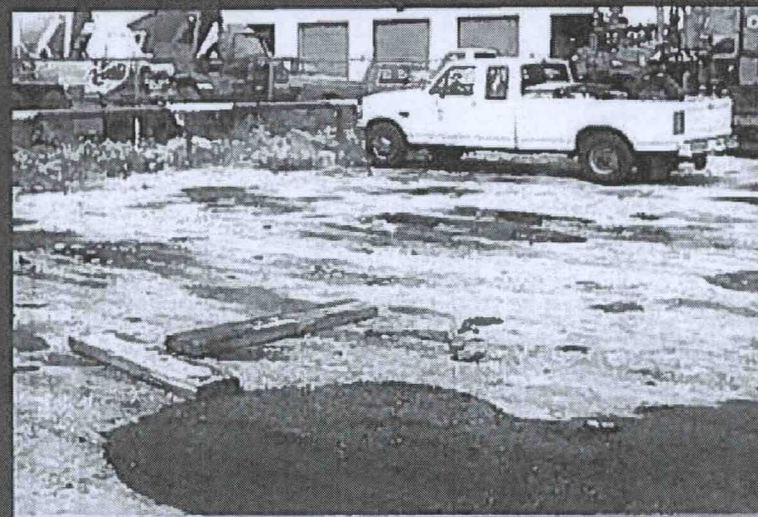
12

GROUNDWATER POLLUTION



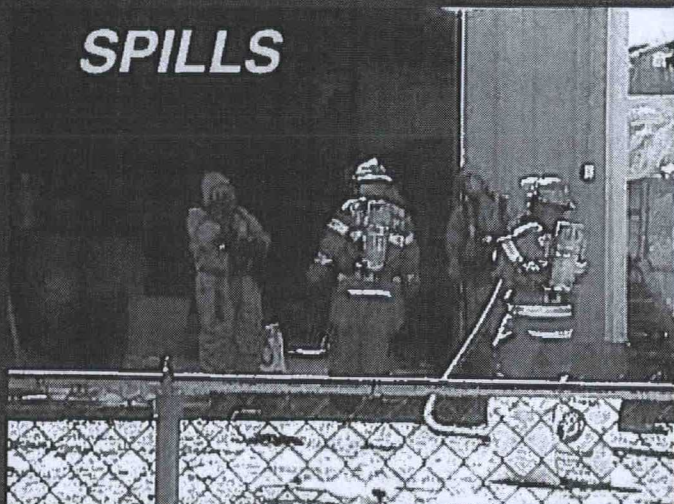
LEAKING EQUIPMENT
MUST BE REPAIRED

SPILLS AND LEAKS
MUST BE CLEANED UP

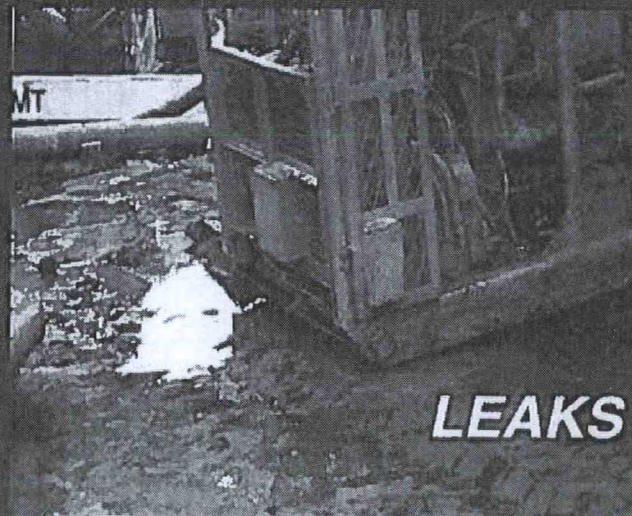


LAND POLLUTION

SPILLS



LEAKS



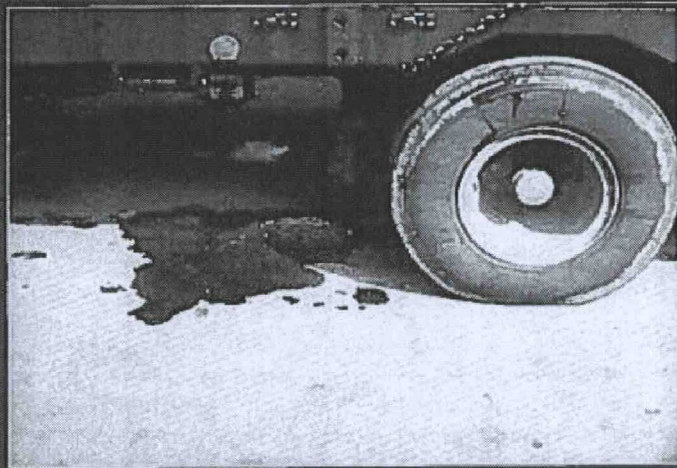
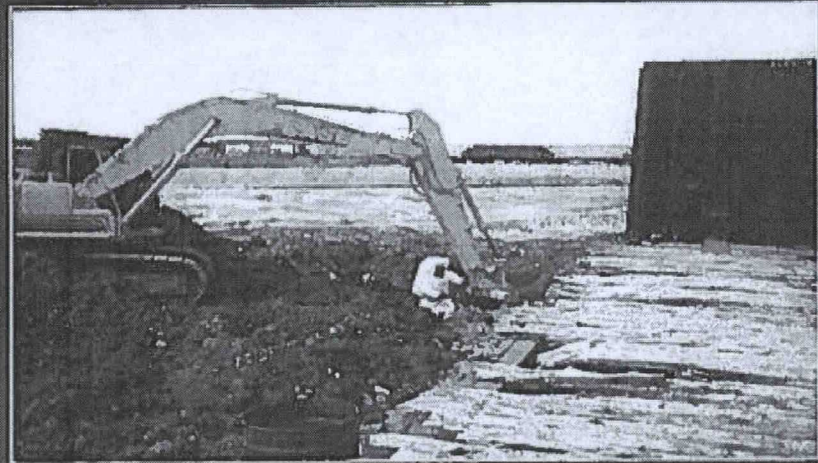
CHEMICALS



CHEMICALS



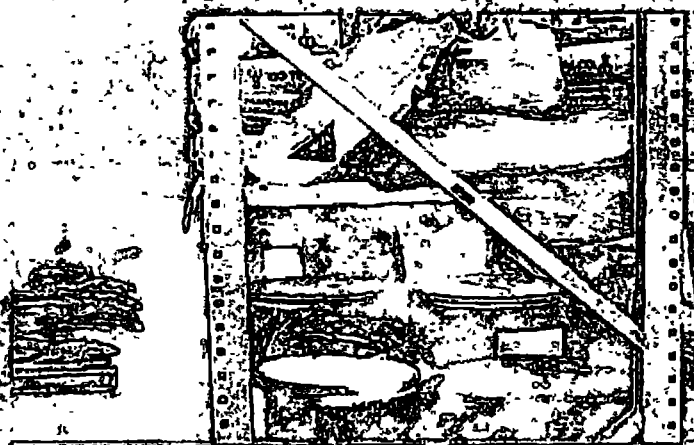
YES, WE DO IMPACT THE ENVIRONMENT!



WASTE MANAGEMENT

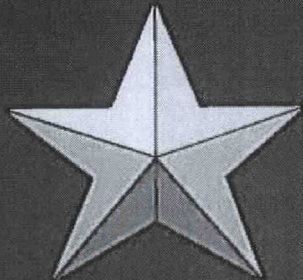


NOT ACCEPTABLE

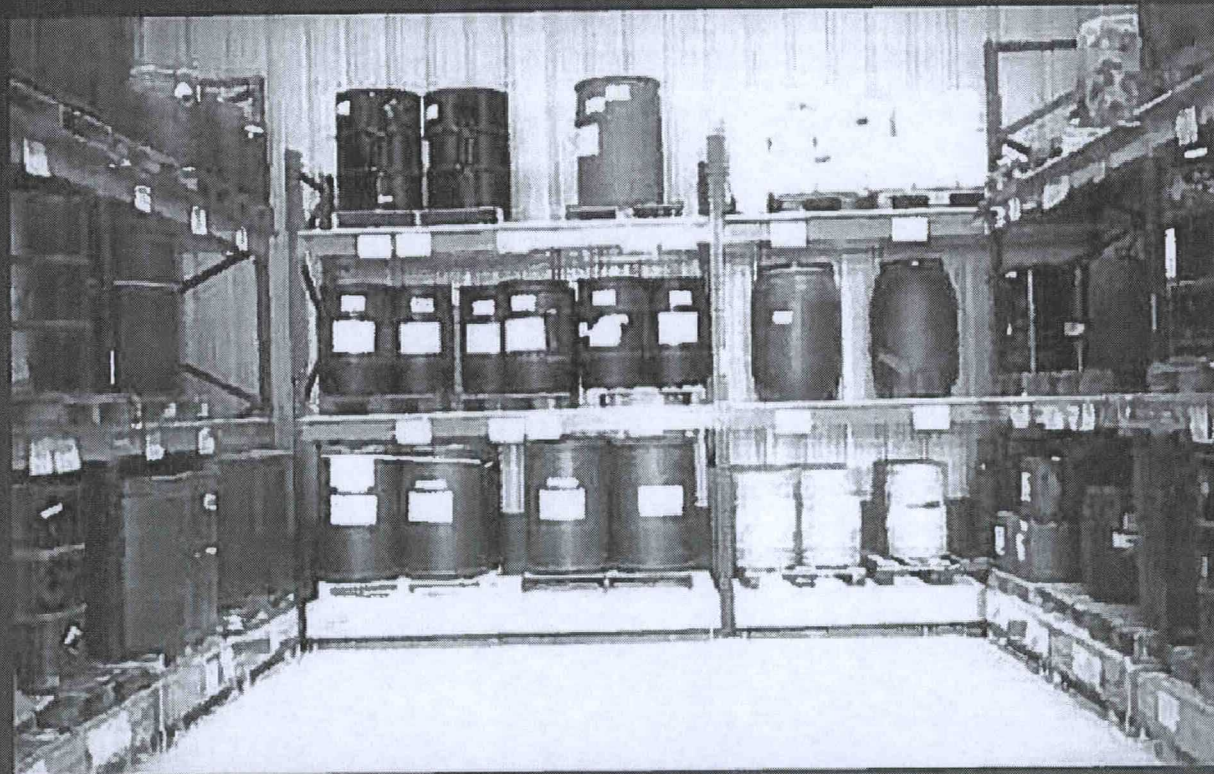


WASTE MINIMIZATION

EXCELLENT



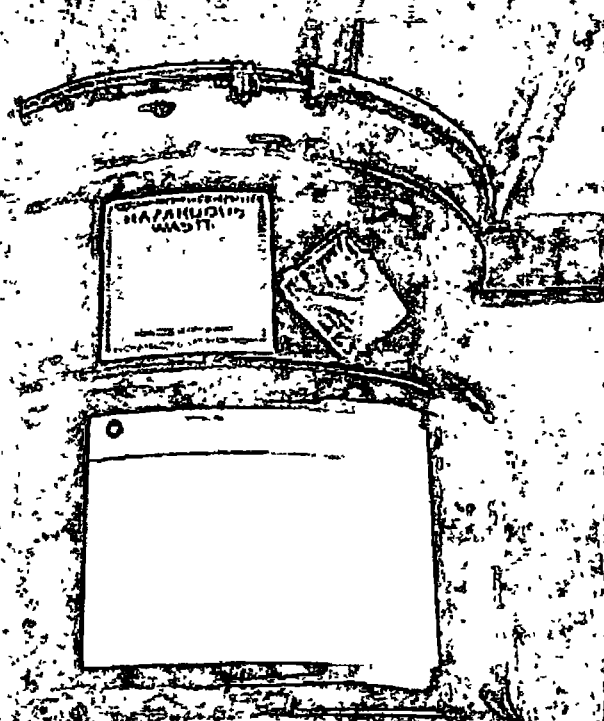
*GOLD
STAR*



PROPER
STORAGE

17

WASTE MANAGEMENT

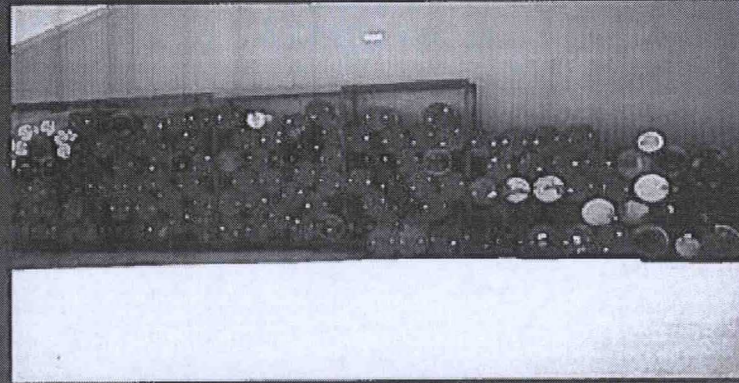


HAZARDOUS
WASTE

GOOD
JOB!

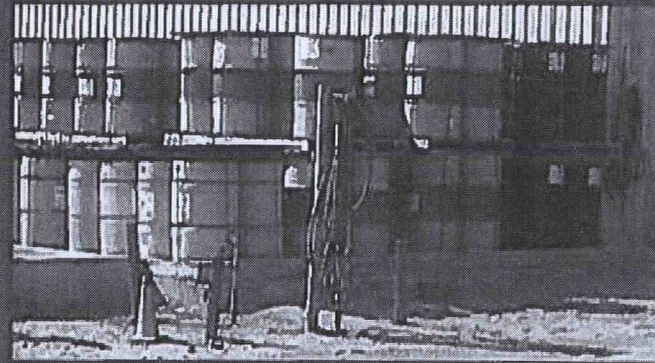
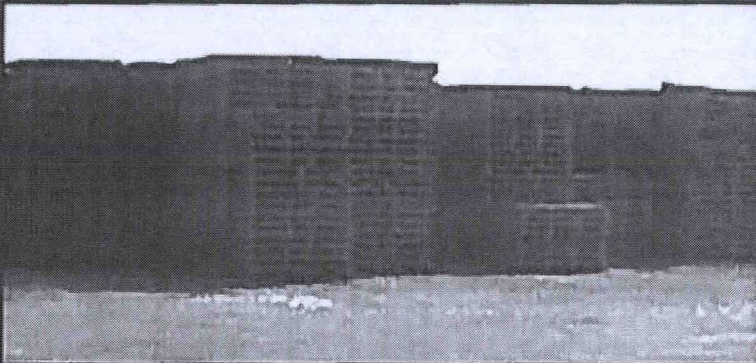
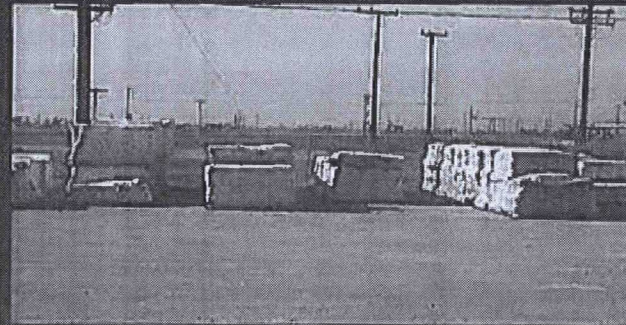
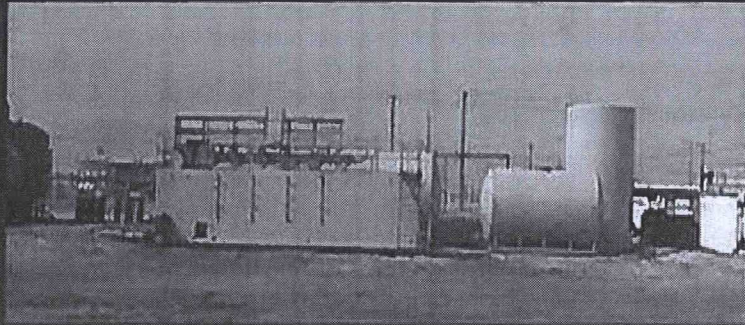
EMPTY CONTAINER STORAGE

PROPER STORAGE



NOT ACCEPTABLE

WASTE MINIMIZATION



GOOD HOUSEKEEPING

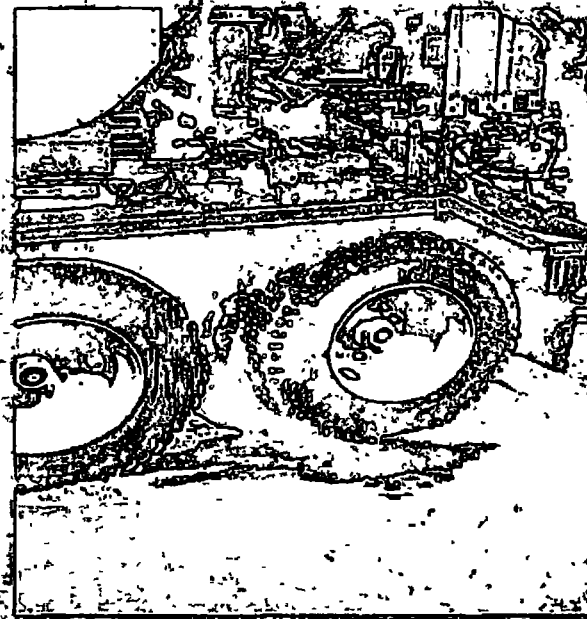
ENVIRONMENTAL PERFORMANCE EXPECTATIONS

- Two Cases of Intentional Dumping
- Employees Were Impacted
- Loss of Work From Customer
- Public Perception
- Customers' Perception
- Cost of Cleanup

21

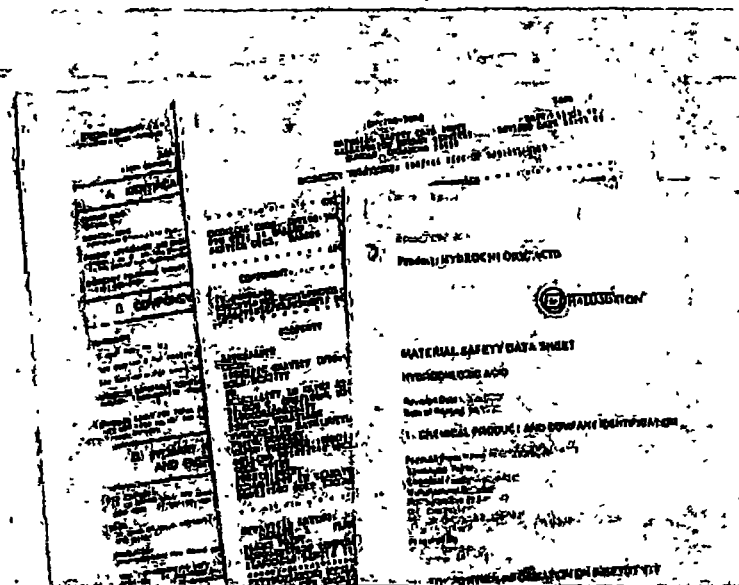
PRE-TRIP

- Equipment Maintenance
- Proper Equipment for the Job



PREPARATION

- Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) Review
- Spill Materials
- Spill Contingency Plan
- Personal Protection Equipment (PPE)



WALK AROUND INSPECTION

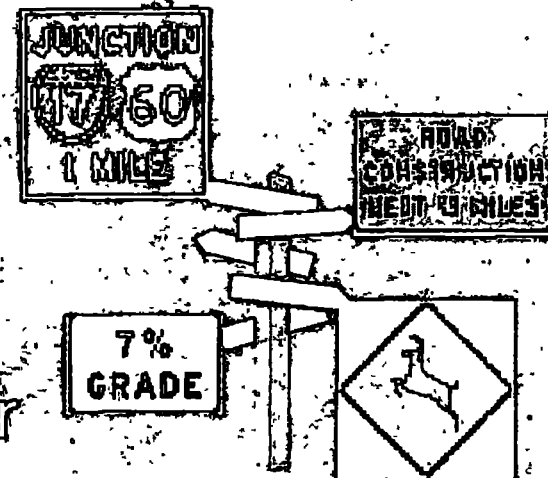
- Condition of Chemical Containers
- Properly Secured
- Labeled
- Placards
- Additional Equipment Needs
- Spill Materials Available

WALK AROUND INSPECTION

- Valves/Caps Closed
- Condition of Equipment
- Hydraulic Connections
- Pump Oilers
- Pans/Trays
- Equipment Leaks

ON THE ROAD

- Pre-Trip Meeting
 - ✦ Pre-Determined Route
 - ✦ Convoy
 - ✦ Watch Out for Each Other
 - ✦ Danger Areas



Intersections

Schools

Hidden Drives



Lease Roads

Steep Grades

Railroad Crossings

ON THE ROAD

- Lights On
- Safety Belts
- Periodic Stops to Check Load
- Continuous Monitoring of Load in Mirrors

AT THE WELL SITE

Pre-Job Meeting

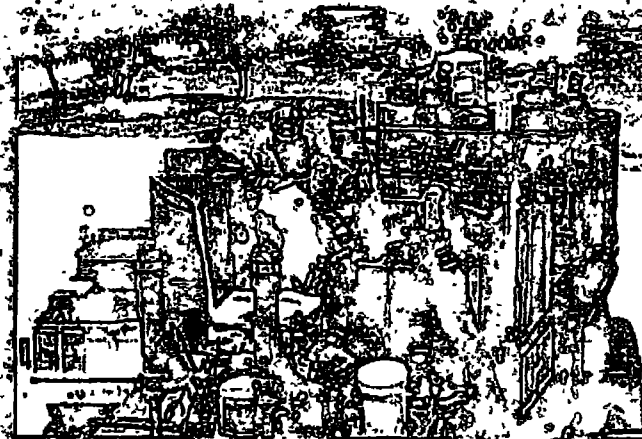
Gathering Points

Evacuation Route

Dangers/Risks

Potential Spill/Releases

- To The Air
- In The Water
- On The Land



AT THE WELL SITE

Preventative Measures

Spill Kit Locations

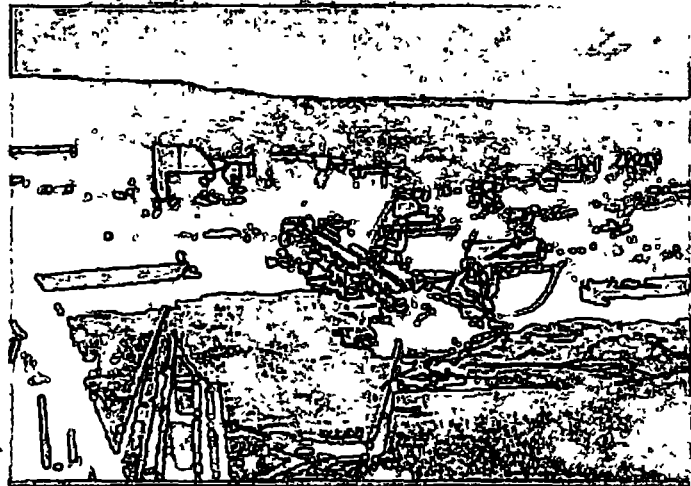
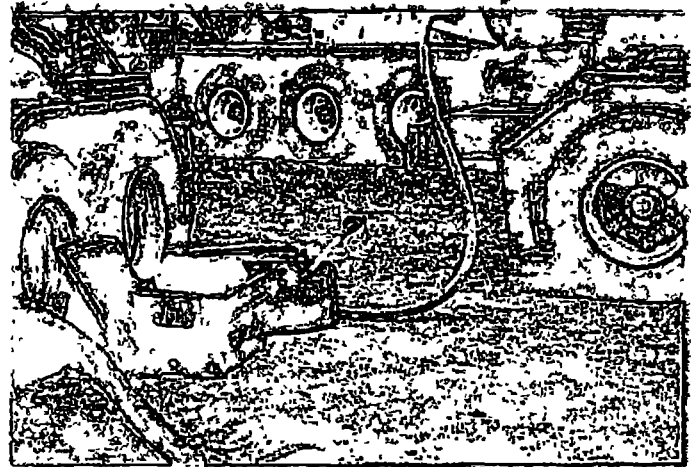
Dirt Dike or Booms

Chemical Storage

Container Condition

Spotters

Ground Covers



AT THE WELL SITE

Preventative

Vegetable Oils

- Lubrication
- Spray on Coating for Cement

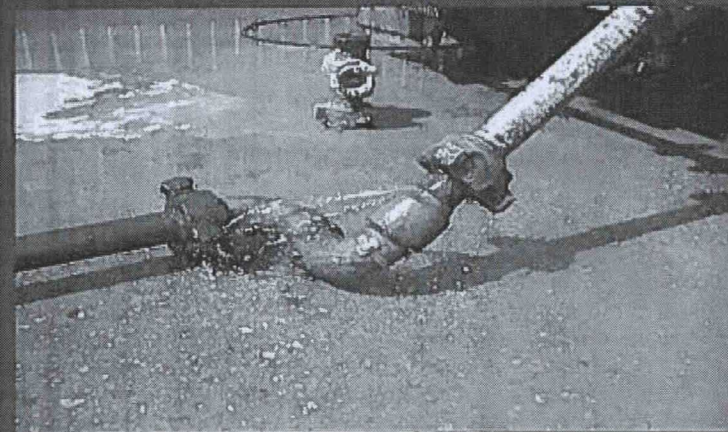
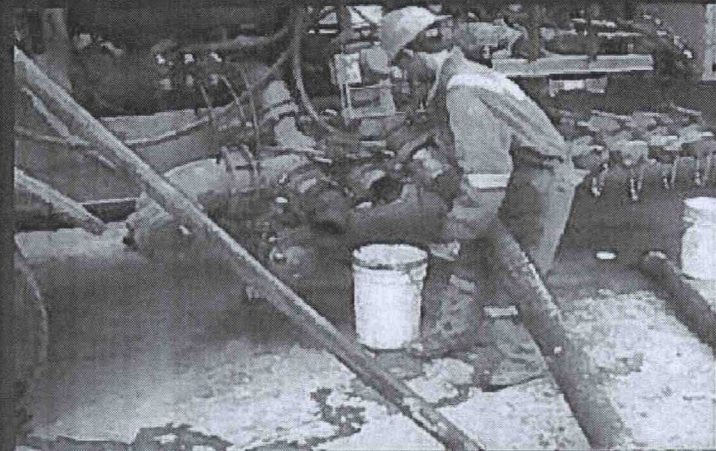
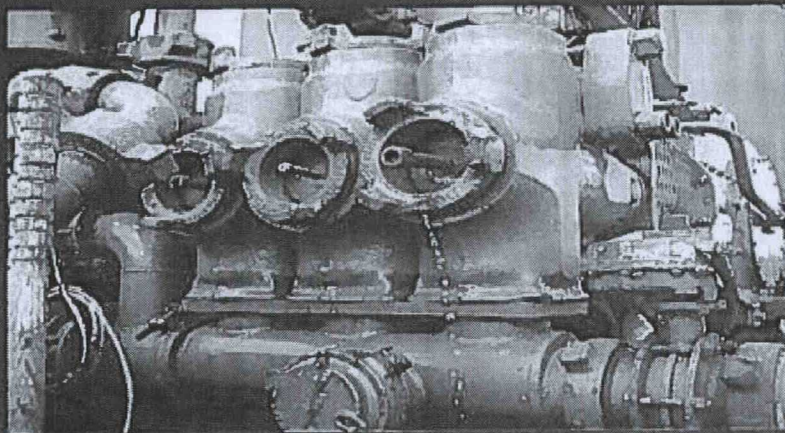
Polyethylene Covered Locations

Dust Socks for Bulk Handling



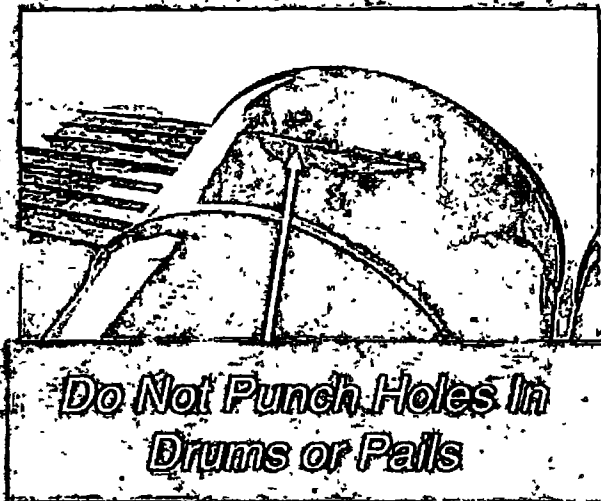
RIGGING UP

- Connections Tight
- Leak Points Identified
- Pans, Trays, Buckets, Containment

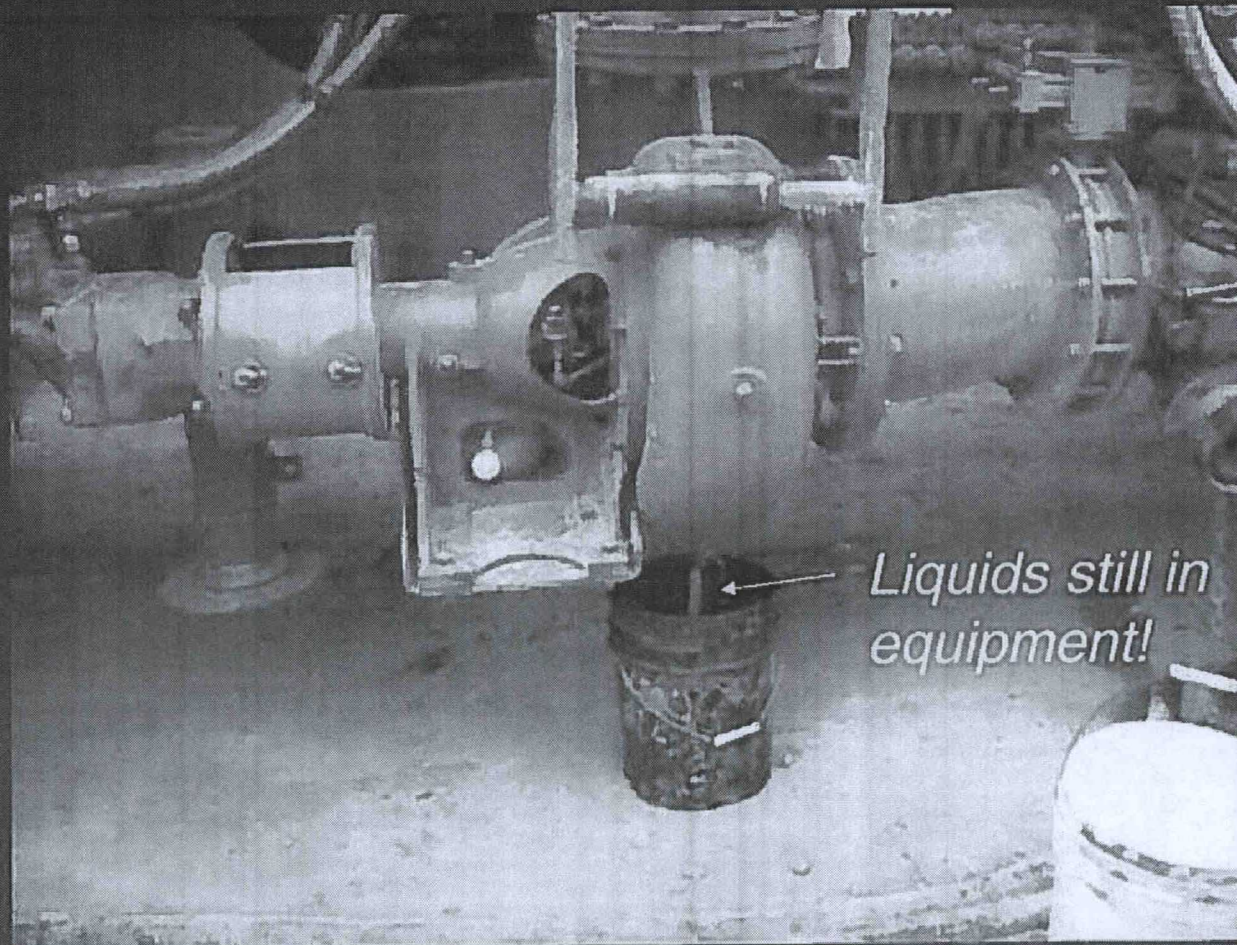


DURING THE JOB

- Chemical Dispensing
 - Right Equipment
 - Right Procedure
 - No Short Cuts
 - Protecting the Soil/Gravel
 - Excess Chemical Management
 - Empty Container Management



DE-MOBILIZATION



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DE-MOBILIZATION

- Spilled Sand, Cement or Chemical
- Drip Pans/Trays
- Pump Oiler Capture Devices
- Clean Up Trash
- Valves Closed
- Hoses & Iron Drained



POST JOB MEETING

- Review Environmental Performance
- Critique Reaction to Spills/Releases
- Review Reporting Requirements
- Police Area for Spills, Drips, and Trash
- Make Reports to Supervisors and Customers



NO DUMPING ALLOWED

"The intentional discharge or release of waste material, whether liquid, solid or otherwise, is prohibited and/or regulated by numerous laws and regulations that govern the company's business"

BEST PRACTICES

- NO Draining, Dumping or Other Intentional Releases or Discharges of Material From Our Equipment to the Environment
- Provisions Must be Made for Proper Cleanup and Draining of Equipment
- Waste Must be Managed Correctly

SPILLS



ALL SPILLS must be cleaned up

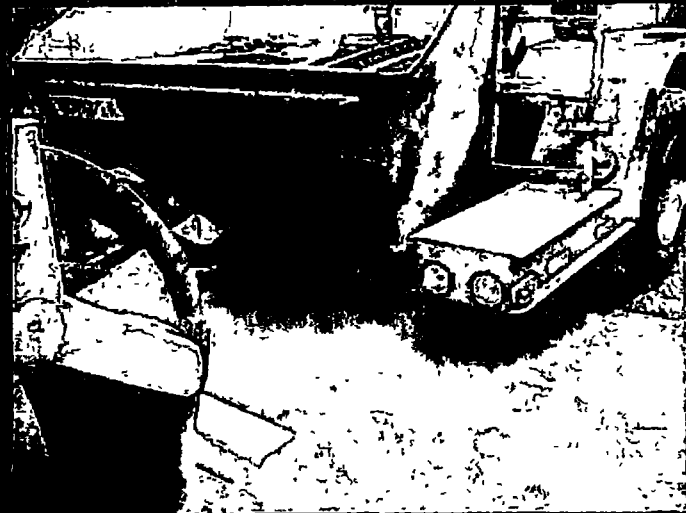
"No such thing as fresh water; once it is in our equipment - it is now waste water..."

OUR GOAL

Zero Discharge

No dumping here!

- Plan
- Improve Processes and Equipment
- Eliminate Leaks, Drips and Spills
- Develop Solutions



WHAT IS A "RELEASE"?

"The unintentional, inadvertent, accidental escape of material from its container"

Whether from a tank, drum, pail, truck, fuel tank, hose, pump, filter, pit, etc.

RESPONDING TO RELEASES

- Clean Up All Spills
 - Regardless Of Material
 - Regardless Of Volume
 - Regardless Of Size
 - Regardless Of Location
 - Regardless Of Customer's Tolerance

WHEN DO YOU CLEAN UP A SPILL?

Immediately!!!!

WHY REPORT?

- Federal Reportable Quantities
- State/Provincial Reporting Requirements
- Halliburton Reporting Requirements
- Collect Data to Determine:
 - Re-engineer Processes
 - Re-design Equipment
 - Re-construct Facilities
 - Further Train Employees

WHO REPORTS?

- Who Is Responsible

- Person Who:

- Causes
 - Discovers
 - Witnesses

HOW TO REPORT?

- Supervisor ; Facility Manager
- Service Coordinator; FSM; Service Leader
- Health, Safety & Environment (HSE) Advisor
- Natural Work Area (NWA)-Specific Reporting Sequence
- Support Staff
- Regulatory Authority

REPORTING

- Environmental Incidents
 - Reportable
 - Recordable

Environmental Spills – Recording/Reporting Limits

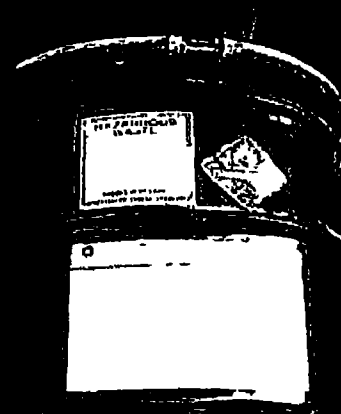
Substance Released	Target: English Unit (Metric Unit)	
Radioactive Materials	Any: Any Amount	
Explosive Materials	Any: Any Amount	
Dangerous/Hazardous Waste	Any: Any Amount	
Hydrocarbons, Oil / Oil Products, Petroleum including fuels and crude oil (includes, but not limited to UN Hazard Class 3)	Released to Soil: 50 gal (190 L)	Released to Water: 3 gal (11 L)
Oxidizers and organic peroxides (UN Hazard Class 5)	Soil: Liquid: 5 gal (19 L) Solid: 75 lbs. (34 kg)	Water: Liquid: 5 gal (19 L) Solid: 10 lbs. (4.5 kg)
Poisonous or Toxic (UN Hazard Class 6)	Released to Soil: 5 gal (19 L)	Released to water: 1 gal (4 L)
Corrosives : Acid, Bases (UN Hazard Class 8)	Soil: Liquid: 50 gal (190 L) Solid: 75 lbs. (34kg)	Water: Liquid: 50 gal (190 L) Solid: 25 lbs. (11 kg)
All Other Hazardous Materials (i.e., UN Hazard Class 9, 4.1, 4.2, etc.,)	Liquid: 50 gal (190 L) Solid: 75 lbs. (34 kg)	
Particulates: e.g., Sand, Proppant (coated or not), Cement, Barite, Bentonite, Lime.	Air or Ground: 1,000 lbs. (454 kg)	Released to water: 500 lbs. (227 kg)
Produced, “process” water	Any: 500 gal (1.9 m ³)	
Fresh water	Any: 1000 gal (3.9 m ³)	

WE'RE NOT DONE YET!

- Wash Rack Procedures
 - Always Get Approval Before Dumping Anything on the Wash rack!
- Managing Excess Chemicals
 - Labeling
 - Packaging
 - Back Into Inventory
 - Minimize/Eliminate Waste

WASTE MANAGEMENT

- Managing Waste Chemicals
 - ⌞ Labeling
 - ⌞ Packaging
 - ⌞ Empty Containers
 - ⌞ Proper Procedure for Storing
 - ⌞ Designated Storage Area



Good

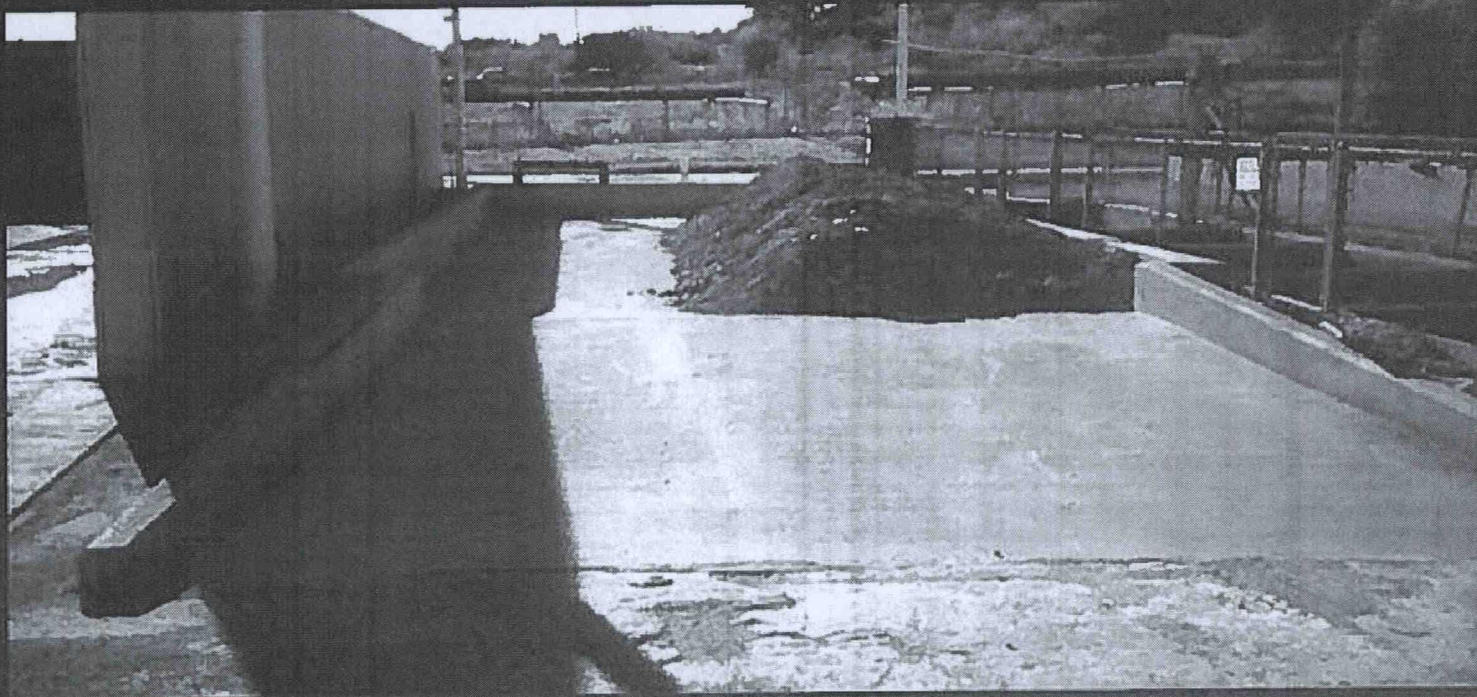


Not Good!

WASTE MANAGEMENT

- Managing Bulk Waste
 - ▣ Acid Returns
 - What to Do With Them?
 - ▣ Gel Returns
 - Where Do You Put It?
 - ▣ Cement Returns
 - Proper Procedure?
 - ▣ Proppant Returns
 - Proper Procedure?

PROPER WASTE MANAGEMENT



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SUMMARY

- We Do Have the Potential to Impact the Environment
- We Must Plan Ahead
- Maintain Equipment
- Proper Equipment for the Job
- Spill Materials Available

SUMMARY

- Capture or Cleanup All Spills/Leaks/Drips
- Report Spills As Per Requirements
- Recognize Potential Problems Before They Occur
- Develop/Implement Solutions
- Recognize How Your Actions or Lack of Action Can Impact the Environment

E

A

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100% Recycled



30% PCW



SmB

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11149190	2113	HOMER CITY	4-5-14
MO# 311400639 V = OK F = Fail (Create RPM order) N/A = not applicable			
Where was PM performed?		Vendor	Shop <input checked="" type="checkbox"/> Field
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature			
Employee Name and Number. R. BEM - 521576		Date 4-5-14	
Employee Name and Number. C. Glass, Jr - 523089		Date: 4-5-14	
Employee Name and Number. J. Burt 495442		Date: 4/7/14	
SAFETY			
1	**** Lock out tag out unit as per HMS procedures. ****		<input checked="" type="checkbox"/>
2	Conduct safety huddle prior to work to identify safety hazards		<input checked="" type="checkbox"/>
3	Wear appropriate PPE before beginning work.		<input checked="" type="checkbox"/>
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		<input checked="" type="checkbox"/>
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current		<input checked="" type="checkbox"/>
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts		RB
7	Check proper operation of air restriction gauge		RB
8	Replace air filters		RB
9	Inspect to insure air intake covers are in place		RB
10	Test emergency shutdown devices if equipped A. With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch. Engine should stop and rig savers should close. Diagnose and repair savers if they fail to operate properly. For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test: Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B. Ensure rig savers are properly latched in the open position after the test.		F
11	Check radiator, mounts, supports and guards		RB
12	Check all hoses, lines and connections for leaks		RB
13	Check radiator for obstruction and condition		RB
14	Check coolant level and protection to minus 34° F (-37° C)		RB
15	Check fan hub and fan assembly for proper operation and condition		RB
16	Check engine cooling system for contamination		RB
17	Check belt condition and adjust if needed		RB
18	Pressure test cooling system and cap		RB
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)		N/A
20	Change engine oil and filter		RB
21	Collect engine oil samples and submit for analysis		N/A
22	Check engine lubrication system for leaks or damage		RB
23	Check condition of hot oil hoses		RB

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks		RB
25	Check fuel tank mounting and condition		RB
26	Check condition of fuel lines		RB
27	Change fuel filters		RB
28	Check fuel cap and vents		RB
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full		N/A
30	Check exhaust system for leaks or damage		RB
31	Check for exhaust system missing parts, loose mounts		RB
32	Check rain cap for proper mounting and operation		RB
33	Check for cracks in muffler flange or mounting		RB
34	Replace open crankcase ventilation filter. SAP part # 101597134. Torque cap to 220 in/lbs		N/A
35	Clean CRS head. SAP part # 101597135		N/A
36	Inspect spark plug for carbon build up on CRS head. Replace with SAP part # 101597157 if		N/A
37	Replace any manifold that is cracked		RB
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed		RB
39	Check cables and wiring for routing and condition		RB
40	Check battery box and cover condition and mounting		RB
41	Check alternator and wiring condition		RB
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> . Create a separate MO to document and use assembly code PEQ-13-008		NOT TICK H
43	Check voltage of alternator output and replace if needed		✓
44	Repair any light not working properly. Check condition of reflectors and reflective tape		#
45	Check wiring for condition, properly routed and secured		RB
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>		RB
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks		
48	Check volume tank condition and drain condensate		N/A
49	Verify operation of safety valve		
50	Check operation and condition of sand screw vibrators		
HYDRAULIC SYSTEMS		LH/FT	RH
51	Check for leaks and oil level		RB
52	Check condition of hoses and routing		RB
53	Check hydraulic pumps for leaks and mounting		RB
54	Check hydraulic motors for leaks and mounting		DR
55	Check hydraulic control valves for leaks and mounting		DR
56	Check oil cooler for leaks and condition		DR
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required		RB
58	Check automatic tub level valve for operation		SB
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting		CK
60	Check turbine agitator		CK
61	Check for leaks		CK
62	Check condition of tub screen and bolts.		CK
63	Ensure that all suction and discharge manifold outlets have tethered caps installed.		CK
64	Check condition of tub screen and bolts. Refer to bulletin: <u>SEQ-00-011</u>		CK

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date: 3/27/2014

HESI00223

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			T
66	Check hatch cover for operation and damage			I
67	Check hatch latching devices for operation and damage			I
68	Ensure sealing surface is clean and gasket is in good condition			I
69	Check hatch vent for operation and damage			I
70	Check turbine agitator			I
71	Check shaft motor coupling			I
72	Check for leaks			I
GAUGE PANEL				LH/FT RH
73	Check panel mounting and latch pins		CC	CC
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			CC
75	Check for secure mounting of attached components			CC
76	Check stairway for operation			CC
77	Lubricate joints on stair way			CC
78	Check hydraulic cylinder for mounting and leaks			CC
79	Check fluid level in reservoir			NA
80	Check switch connections and mounting			NA
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			CC
82	Check cab mounts and condition			CC
83	Check doors, latches and windows			CC
84	Check mounting and condition of instrument panels and cabinets			CC
85	Check for broken switches and gauges			CC
86	Check condition of electrical components			CC
87	Check control stand for secure mounting			CC
88	Check hydraulic controls for leaks and operation			CC
SANDSCREWS				CH
89	Check mounting supports and safety latch			CK
90	Check sand screw mounting bolts on FB4K for tightness and wear			CK
91	Check for proper operation.			CK
92	Check for damage or wear			CK
93	Lubricate all rollers and safety latch.			CK
94	Check valves and hoses on injection system			F
95	Check mounting of motors			CK
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw			CK
97	Check gear box oil level and condition.			CK
98	Ensure Hopper Grate is in good condition and bolted in place			CK
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts			CC
100	Check mounting of micro motion meters and controllers if applicable			CC
101	Check mounting of pumps, hoses, and encoders or counters.			CC
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate	+	CC	CC
103	Check mounts for cracks, wear or missing parts	+	CC	CC
104	Check for leaks and loose parts.	+	CC	CC

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00224

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

U-JOINTS AND DRIVE LINES		CH
105	Check U-joints and drive shafts for loose parts or damage	CK
106	Lubricate drive line and u-joints	CK
107	Check guard condition and verify proper and secure mounting	CK
GEAR BOX		LH/FT RH
108	Check mounts	DR DR
109	Check oil level and for contamination Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	DR DR
110	Inspect vents	DR DR
111	Check gear box for leaks	DR DR
CLUTCH AND LINKAGE		LH/FT RH
112	Check clutch and adjust if needed	I I
113	Check linkage for loose or missing parts	I I
114	Lubricate bearing and linkage	DR DR
CRANE		SUC DIS
115	Check mounting	I I
116	Check electrical connection	I I
117	Check pinning devices	I I
118	Check for proper operation	I I
119	Check electrical cables and connections	I I
120	Check cable and hook	I I
121	Check for required decals	I I
SACK ELEVATOR		CH
122	Check for proper operation	I
123	Check mounting for damage or loose bolts	I
124	Check chain adjustment	I
125	Check rollers and slides	I
CHASSIS COUPLING DEVICES AND LANDING GEAR		CH
126	Check for proper operation	CC
127	Check for damage and wear	CC
128	Check king pin with gauge	CK *
129	Lubricate as required	CC
BLOWER		CH
130	Verify blower is mounted properly and fasteners are secure	CC
131	Check drive coupling for condition and lubrication	CC
132	Lubricate blower box at fittings	CC
133	Check oil level in blower box reservoir	CC
134	Check controls for mounting and operating labels	CC
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	rpm *
136	Check air filter, plumbing, and filter housing	CC
137	Check discharge piping and verify valve operation	CC
GENERATOR		CH
138	Check generator for proper operation	DR *
139	Check output voltage (120) and hertz (60)	DR *
140	Check 110vac lighting system	DR *
141	Check for secure mounting	CC
142	Check hydraulic motor coupling	CC
143	Check cables and connections	CC

Process Owner Global Equipment Maintenance Manager
Approver Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00225

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

IRON AND HOSE RACKS						CH	
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc. are held securely in place.					CC	
145	Check for secure mounting of racks and all storage devices					CC	
FRAME AND SUSPENSION						CH	
146	Check all mounts for missing bolts and damage					CK	
147	Check frame for cracks and damage					CK	
148	Check safety guards for secure mounting and placement					CK	
149	Check suspension components					CK	
150	Check bumpers and fenders for mounting and damage					CK	
151	Lubricate chassis and components					CC	
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets.					CK	
BRAKES						CH	
153	Check all brake components					CK	
154	Check brake lining condition & thickness 1/4" min (6.35mm)					CK	
155	Check brake hoses for certified markings and conditions					CK	
156	Ensure all hoses from valves to spring brakes are wrapped with protective material					CK	
157	Check condition of glad hands					CK	
158	Check brake hoses for routing and supports every 15 inches					CK	
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)					fmu	
160	Check brake adjustments using travel method and record measurement					CK	
⇐ Front of Trailer		RF	1"	RM	1"	1"	
		LF	1"	LM	1"		
TIRES AND WHEELS						CH	
161	Inspect wheel hubs and seals, check oil level					CK	
162	Check wheel bearings for excessive play (Wheel must be off the ground with brakes released)					CK	
163	Check tires per regulatory requirements					CK	
164	Torque all wheels to manufacturers specifications					CK	
	Double Cap Nut Disc Wheel (inner and outer)	450-500 ft-lb				—	
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)	450-500 ft-lb				CK	
165	Check wheels, rims and mounting					CK	
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")					CK	
⇐ Front of Trailer			Pressure	Tread Depth		Pressure	Tread Depth
		RMO	110	22	RRO	110	21
		RMI	110	23	RRI	110	21
		LMI	110	21	LRI	110	22
		LMO	110	22	LRO	110	22

Process Owner Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00226

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE RUN UP (indicate units of measure)								CH
167	Check all gauges for functionality and clarity							km
168	Record voltmeter	Meter 1	26	Meter 2	26	Volt		km
169	Record engine oil pressure at 1000 rpm	LH/FRT		RH	42	psi/bar		km
170	Record air pressure that compressor unloads							psi/bar
171	Record sand screw maximum RPM							rpm
172	Record hydraulic psi:	LH/FRT	RH		Record hydraulic psi:	LH/FRT	RH	psi/bar
	Parallel Charge	4	200		Suction Centrifugal	500		psi/bar
	Parallel LA #1	500			Agitator	300		psi/bar
	Parallel LA #2	500			Discharge Centrifugal	500		psi/bar
	Common Charge	450			Discharge Cent Charge			psi/bar
	Engine Fan	400			Case Drain	1		psi/bar
	SS#1	300			Return	0		psi/bar
	SS#2	300			Loop	2		psi/bar
173	Record Hydraulic oil temperature							°F
174	Ensure no oil leaks and recheck oil to verify proper level							km
ENVIRONMENTAL								CH
175	Dispose of all waste properly. Ensure all spills are cleaned up and properly contained.							
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							km
177	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the ESG Branding web page for guidelines).							km
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable) Replace sticker if within 90 days of expiration date.				DEC 2013	Date	km
	b	Was a new DOT/CVIP sticker applied? (Circle response)				Yes	No	km
	c	Signature:					Date	km
179	Install new sticker to indicate when the next PM is due							km
180	Record date when next PM is due.							Date
181	Record hours/miles/km when next PM is due							Hour/Miles/KM

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00227

Required Cab Paper Work Checksheet

☐ **Current Vehicle Registration**

☒ **Proof of Insurance Form**

☒ **Federal Hazmat Form (Placard Vehicles Only)**

☒ **Uniform Permit of Ohio, Nevada, West Virginia (Placard vehicles only)**

☒ **State Inspection Sticker (Where states require)**

☒ **Check all door emblems, USDOT numbers to insure that they are in good shape.**

☒ **Check IFTA sticker is current**

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	DA #3 LOCKED UP		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
2	Ry SAVER did not Trip AT 1600 RPM'S		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
3	BROKEN INJECTION TUBE IN SAND HOPPER		
✓	NO REPAIR NEEDED		
	Mechanic name	Repair date	Approval acquired Maintenance order #
4	WORK light on Right side unit in front of cab was fixed		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
5	LT #3 missing Gard. - IN TRACTOR		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
6	LA #5 + LA 6 MANUAL OVERRIDES MIXED UP - MIGHT HAVE HYD RUNNING TO WRONG LA		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
7	LA 7 DOESNT WORK		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
8	T/S & Repair rig saver		
✓	Mechanic name	Repair date	Approval acquired Maintenance order #
9			
	Mechanic name	Repair date	Approval acquired Maintenance order #
10			
	Mechanic name	Repair date	Approval acquired Maintenance order #

Report any errors found on check sheet to supervisor

Process Owner Global Equipment Maintenance Manager
Approver Larry Deweese

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Preventive Maintenance Check Sheet
Revision Date: 3/27/2014

HESI00229

LOCKOUT/TAGOUT CHECKLIST #1
Heavy duty vehicular power Units i.e. tractors, forklifts, bodyloads, etc.

Unit # 11149190

Workorder # 311400639

Date 4-5-14

Location of Work Homer C. 7x84 Shop

Description of Work PM/RPMs

Authorized Employee C. Clossin Emp # 583039

All affected employee(s) informed of lockout / tagout Yes ☒ No ☐

1 Choke / Block wheels as appropriate. Yes ☒ No ☐

2 Attach keys to cab with multi-lock adapter Yes ☒ No ☐

3. Perform diagnostics as required to identify repair or maintenance need Yes ☒ No ☐

AFTER DIAGNOSTICS HAVE BEEN COMPLETED

4. Bled off all air systems to zero PSI by venting main air tanks. Yes ☒ No ☐

5. Disconnect positive battery cable Yes ☒ No ☐

6. Place LOCK and TAG on disconnected battery cables Yes ☒ No ☐

PERFORM WORK AS REQUIRED

RESTART AFTER MAINTENANCE IS COMPLETE

Machine and area clear of tools and equipment after work completed? Yes ☒ No ☐

All personnel cleared from machine or equipment prior to re-energizing? Yes ☒ No ☐

Contractor personnel informed of lockout/tagout procedures? Yes ☐ No ☐ N/A ☒

All replacement personnel informed of lockout/tagout status at shift change? Yes ☐ No ☐ N/A ☒

Caution – Some machines or equipment may have secondary power sources and/or residual energy may be present. Consult C6S2 or your supervisor for guidance in identifying suspected secondary residual energy sources and implementing controls as needed

Awareness Reminders:

Thermal – Assure radiator and/or hydraulic systems are cooled down prior to performing work on system components.

Hydraulic – Assure system hoses are bled off prior to performing work on system component

Gravity – Load lifting devices must be relieved of suspended load and load must be secured from movement

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

HA

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11149190	2448 hrs	Station Dangel, OH	5-21-14
MO# 311548832 V = OK F = Fail (Create RPM order) N/A = not applicable			
Where was PM performed? Wells, to. OH		Vendor <input checked="" type="checkbox"/>	Shop <input type="checkbox"/> Field <input type="checkbox"/>
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature			
Employee Name and Number Fleetserve - Zack Zolinski		Date 5-21-14	
Employee Name and Number		Date:	
Employee Name and Number		Date:	
SAFETY			
1	Lock out tag out unit as per HMS procedures	<input checked="" type="checkbox"/>	
2	Conduct safety huddle prior to work to identify safety hazards	<input checked="" type="checkbox"/>	
3	Wear appropriate PPE before beginning work.	<input checked="" type="checkbox"/>	
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly	<input checked="" type="checkbox"/>	
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current	<input checked="" type="checkbox"/>	
ENGINE INSPECTION			
		LH/FT	RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts	<input checked="" type="checkbox"/>	N/A
7	Check proper operation of air restriction gauge	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Replace air filters	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Inspect to insure air intake covers are in place	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Test emergency shutdown devices if equipped A. With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch. Engine should stop and rig savers should close. Diagnose and repair savers if they fail to operate properly. For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test: Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B. Ensure rig savers are properly latched in the open position after the test.	N/A	<input type="checkbox"/>
11	Check radiator, mounts, supports and guards	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Check all hoses, lines and connections for leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	Check radiator for obstruction and condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	Check coolant level and protection to minus 34° F (-37° C) - 45	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15	Check fan hub and fan assembly for proper operation and condition	<input checked="" type="checkbox"/>	<input type="checkbox"/>
16	Check engine cooling system for contamination	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17	Check belt condition and adjust if needed	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18	Pressure test cooling system and cap	<input checked="" type="checkbox"/>	<input type="checkbox"/>
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20	Change engine oil and filter	<input checked="" type="checkbox"/>	<input type="checkbox"/>
21	Collect engine oil samples and submit for analysis	N/A	<input type="checkbox"/>
22	Check engine lubrication system for leaks or damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>
23	Check condition of hot oil hoses	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Process Owner Global Equipment Maintenance Manager
Approver: Larry Deweese

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Preventive Maintenance Check Sheet
Revision Date 5/1/2014

HESI00232

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks	✓	✓
25	Check fuel tank mounting and condition	✓	✓
26	Check condition of fuel lines	✓	✓
27	Change fuel filters	✓	✓
28	Check fuel cap and vents	✓	✓
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full	✓	✓
30	Check exhaust system for leaks or damage	✓	✓
31	Check for exhaust system missing parts, loose mounts	✓	✓
32	Check rain cap for proper mounting and operation	✓	✓
33	Check for cracks in muffler flange or mounting	✓	✓
34	Replace open crankcase ventilation filter SAP part # 101597134 Torque cap to 220 in/lbs	✓	✓
35	Clean CRS head. SAP part # 101597135	✓	✓
36	Inspect spark plug for carbon build up on CRS head Replace with SAP part # 101597157 if	✓	✓
37	Replace any manifold that is cracked	✓	✓
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed	✓	✓
39	Check cables and wiring for routing and condition	✓	✓
40	Check battery box and cover condition and mounting	✓	✓
41	Check alternator and wiring condition	✓	✓
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin PEQ-13-008-A Create a separate MO to document and use assembly code PEQ-13-008 .		OP
43	Check voltage of alternator output and replace if needed	✓	✓
44	Repair any light not working properly Check condition of reflectors and reflective tape	✓	✓
45	Check wiring for condition, properly routed and secured	✓	✓
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per Mechanic's Toolbox portal issue 48709	✓	✓
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks	✓	✓
48	Check volume tank condition and drain condensate	✓	✓
49	Verify operation of safety valve	✓	✓
50	Check operation and condition of sand screw vibrators	✓	✓
HYDRAULIC SYSTEMS			CH
51	Check for leaks and oil level	✓	✓
52	Check condition of hoses and routing	✓	✓
53	Check hydraulic pumps for leaks and mounting	✓	✓
54	Check hydraulic motors for leaks and mounting	✓	✓
55	Check hydraulic control valves for leaks and mounting	✓	✓
56	Check oil cooler for leaks and condition	✓	✓
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required	✓	✓
58	Check automatic tub level valve for operation	✓	✓
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting	✓	✓
60	Check turbine agitator	✓	✓
61	Check for leaks	✓	✓
62	Check condition of tub screen and bolts	✓	✓
63	Ensure that all suction and discharge manifold outlets have tethered caps installed.	✓	✓
64	Check condition of tub screen and bolts Refer to bulletin: SEQ-00-011	✓	✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 5/1/2014

HESI00233

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH		
65	Check mounting			✓		
66	Check hatch cover for operation and damage			✓		
67	Check hatch latching devices for operation and damage			✓		
68	Ensure sealing surface is clean and gasket is in good condition			✓		
69	Check hatch vent for operation and damage			✓		
70	Check turbine agitator			✓		
71	Check shaft motor coupling			✓		
72	Check for leaks			✓		
GAUGE PANEL				LH/FT RH		
73	Check panel mounting and latch pins			✓ / A		
WALKWAY AND SUPPORTS				CH		
74	Check all mounting for cracks and damage			✓		
75	Check for secure mounting of attached components			✓		
76	Check stairway for operation			✓		
77	Lubricate joints on stair way			✓		
78	Check hydraulic cylinder for mounting and leaks			✓		
79	Check fluid level in reservoir			✓		
80	Check switch connections and mounting			✓		
CONTROL HOUSE/STANDS				CH		
81	Check operation of throttles			✓		
82	Check cab mounts and condition			✓		
83	Check doors, latches and windows			✓		
84	Check mounting and condition of instrument panels and cabinets			✓		
85	Check for broken switches and gauges			✓		
86	Check condition of electrical components			✓		
87	Check control stand for secure mounting			✓		
88	Check hydraulic controls for leaks and operation			✓		
SANDSCREWS				CH		
89	Check mounting supports and safety latch			✓		
90	Check sand screw mounting bolts on FB4K for tightness and wear			✓		
91	Check for proper operation			✓		
92	Check for damage or wear			✓		
93	Lubricate all rollers and safety latch			✓		
94	Check valves and hoses on injection system			✓		
95	Check mounting of motors.			✓		
DRY ADDITIVE SYSTEM				CH		
96	Check condition of feeder and screw.			✓		
97	Check gear box oil level and condition.			✓		
98	Ensure Hopper Grate is in good condition and bolted in place			✓		
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH		
99	Check condition of tanks, connection, hose and mounts.			✓		
100	Check mounting of micro motion meters and controllers if applicable.			✓		
101	Check mounting of pumps, hoses, and encoders or counters			✓		
CENTRIFUGAL PUMPS			REC	SUC	DIS	
102	Check oil level in pumps and lubricate			✓	✓	✓
103	Check mounts for cracks, wear or missing parts.			✓	✓	✓
104	Check for leaks and loose parts.			✓	✓	✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date 5/1/2014

HESI00234

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

U-JOINTS AND DRIVE LINES		CH
105	Check U-joints and drive shafts for loose parts or damage	✓
106	Lubricate drive line and u-joints	✓
107	Check guard condition and verify proper and secure mounting	✓
GEAR BOX		LH/FT RH
108	Check mounts.	✓ ✓
109	Check oil level and for contamination. Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	✓ ✓
110	Inspect vents	✓ ✓
111	Check gear box for leaks	✓ ✓
CLUTCH AND LINKAGE		LH/FT RH
112	Check clutch and adjust if needed	N/A N/A
113	Check linkage for loose or missing parts	↓ ↓
114	Lubricate bearing and linkage	↓ ↓
CRANE		SUC DIS
115	Check mounting	N/A N/A
116	Check electrical connection	↓ ↓
117	Check pinning devices	↓ ↓
118	Check for proper operation	↓ ↓
119	Check electrical cables and connections	↓ ↓
120	Check cable and hook	↓ ↓
121	Check for required decals	↓ ↓
SACK ELEVATOR		CH
122	Check for proper operation	N/A
123	Check mounting for damage or loose bolts	↓
124	Check chain adjustment	↓
125	Check rollers and slides	↓
CHASSIS COUPLING DEVICES AND LANDING GEAR		CH
126	Check for proper operation	✓
127	Check for damage and wear	✓
128	Check king pin with gauge	N/A
129	Lubricate as required	✓
BLOWER		CH
130	Verify blower is mounted properly and fasteners are secure	✓
131	Check drive coupling for condition and lubrication	✓
132	Lubricate blower box at fittings	✓
133	Check oil level in blower box reservoir	✓
134	Check controls for mounting and operating labels	✓
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	OP rpm
136	Check air filter, plumbing, and filter housing	✓
137	Check discharge piping and verify valve operation	✓
GENERATOR		CH
138	Check generator for proper operation	✓
139	Check output voltage (120) and hertz (60)	✓
140	Check 110vac lighting system	✓
141	Check for secure mounting	✓
142	Check hydraulic motor coupling	✓
143	Check cables and connections	✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 5/1/2014

HESI00235

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

IRON AND HOSE RACKS						CH
144	Check all iron and hose securing devices Assure all hoses, fittings, valves, etc. are held securely in place.					✓
145	Check for secure mounting of racks and all storage devices					✓
FRAME AND SUSPENSION						CH
146	Check all mounts for missing bolts and damage					✓
147	Check frame for cracks and damage					✓
148	Check safety guards for secure mounting and placement					✓
149	Check suspension components					✓
150	Check bumpers and fenders for mounting and damage					✓
151	Lubricate chassis and components					✓
152	Check mounting and condition of mud flaps Ensure reflective tape assembly is attached to mud flap brackets					✓
BRAKES						CH
153	Check all brake components					✓
154	Check brake lining condition & thickness 1/4" min (6.35mm)					✓
155	Check brake hoses for certified markings and conditions					✓
156	Ensure all hoses from valves to spring brakes are wrapped with protective material					✓
157	Check condition of glad hands					✓
158	Check brake hoses for routing and supports every 15 inches					✓
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)					✓
160	Check brake adjustments using travel method and record measurement					✓
← Front of Trailer		RF	RM	N/A	RR	✓
		LF	LM	↓	LR	✓
TIRES AND WHEELS						CH
161	Inspect wheel hubs and seals, check oil level					✓
162	Check wheel bearings for excessive play (Wheel must be off the ground with brakes released)					✓
163	Check tires per regulatory requirements					✓
164	Torque all wheels to manufacturers specifications					✓
	Double Cap Nut Disc Wheel (inner and outer)	450-500 ft-lb				N/A
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)	450-500 ft-lb				✓
165	Check wheels, rims and mounting					✓
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")					✓
← Front of Trailer		RMO	RMI	LMI	LMO	Tread Depth
		100	105	100	95	21
		21	21	21	20	20
		RRO	RRI	LRI	LRO	Tread Depth
		105	100	105	105	17
		17	19	20	20	20

Process Owner Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

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HESI00236

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE RUN UP (indicate units of measure)								CH
167	Check all gauges for functionality and clarity							✓
168	Record voltmeter	Meter 1	27.9	Meter 2	N/A	Volt		
169	Record engine oil pressure at 1000 rpm	LH/FRT	50	RH	↓	psi/bar		
170	Record air pressure that compressor unloads							OP
171	Record sand screw maximum RPM							OP
172	Record hydraulic psi	LH/FRT	RH		Record hydraulic psi	LH/FRT	RH	psi/bar
	Parallel Charge	4	N/A	psi/bar	Suction Centrifugal	N/A	N/A	psi/bar
	Parallel LA #1	200		psi/bar	Agitator			psi/bar
	Parallel LA #2	150		psi/bar	Discharge Centrifugal			psi/bar
	Common Charge	N/A		psi/bar	Discharge Cent Charge	↓		psi/bar
	Engine Fan	35.0		psi/bar	Case Drain	0		psi/bar
	SS#1	200		psi/bar	Return	0		psi/bar
	SS#2	200	↓	psi/bar	Loop	0	↓	psi/bar
173	Record Hydraulic oil temperature							70
174	Ensure no oil leaks and recheck oil to verify proper level							✓
ENVIRONMENTAL								CH
175	Dispose of all waste properly Ensure all spills are cleaned up and properly contained							✓
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							✓
177	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the <u>ESG Branding web page</u> for guidelines)							✓
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable) Replace sticker if within 90 days of expiration date				12/13	Date	
	b	Was a new DOT/CVIP sticker applied? (Circle response)				Yes	(No)	
	c	Signature					Date	
179	Install new sticker to indicate when the next PM is due							✓
180	Record date when next PM is due					6-21-14	Date	
181	Record hours/miles/km when next PM is due.					2748 hrs	Hour/Miles/KM	

Process Owner Global Equipment Maintenance Manager
 Approver Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00237

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	Hydraulic tank was very low (41 gts) and has a major leak under tank area		
	Mechanic name:		Approval acquired
	Repair date		Maintenance order #
2	Rain cap is loose		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
3			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
4			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
5			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
6			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
7			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
8			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
9			
	Mechanic name:		Approval acquired:
	Repair date		Maintenance order #
10			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #

Report any errors found on check sheet to supervisor



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HALLIBURTON

HBB/Slurry/FR4K/GEL PRO Trailer

CL-GL-HAL-JEM-PREV-S93B

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11149190	2623 hrs	Homer city	5-31-14
MO# 311659512	V = OK F = Fail (Create RPM order) N/A = not applicable		
Where was PM performed?		Vendor	Shop
		Field	✓
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature <i>[Signature]</i>			
Employee Name and Number:		Date:	
Employee Name and Number:		Date:	
Employee Name and Number:		Date:	
SAFETY			
1	Lock out tag out unit as per HMS procedures		
2	Conduct safety huddle prior to work to identify safety hazards		
3	Wear appropriate PPE before beginning work.		
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current		
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts		✓
7	Check proper operation of air restriction gauge		✓
8	Replace air filters		✓
9	Inspect to insure air intake covers are in place		N/A
10	Test emergency shutdown devices if equipped A. With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch. Engine should stop and rig savers should close. Diagnose and repair savers if they fail to operate properly. For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test. Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B. Ensure rig savers are properly latched in the open position after the test.		N/A
11	Check radiator, mounts, supports and guards		✓
12	Check all hoses, lines and connections for leaks		✓
13	Check radiator for obstruction and condition		✓
14	Check coolant level and protection to minus 34° F (-37° C)		✓
15	Check fan hub and fan assembly for proper operation and condition		✓
16	Check engine cooling system for contamination		✓
17	Check belt condition and adjust if needed		✓
18	Pressure test cooling system and cap		✓
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)		N/A
20	Change engine oil and filter		✓
21	Collect engine oil samples and submit for analysis		N/A
22	Check engine lubrication system for leaks or damage		✓
23	Check condition of hot oil hoses		✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks		✓
25	Check fuel tank mounting and condition		✓
26	Check condition of fuel lines		✓
27	Change fuel filters		✓
28	Check fuel cap and vents		✓
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full		NA
30	Check exhaust system for leaks or damage		✓
31	Check for exhaust system missing parts, loose mounts		✓
32	Check rain cap for proper mounting and operation		✓
33	Check for cracks in muffler flange or mounting		✓
34	Replace open crankcase ventilation filter. SAP part # 101597134. Torque cap to 220 in/lbs		NA
35	Clean CRS head. SAP part # 101597135		
36	Inspect spark plug for carbon build up on CRS head Replace with SAP part # 101597157 if		
37	Replace any manifold that is cracked		
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed		✓
39	Check cables and wiring for routing and condition		✓
40	Check battery box and cover condition and mounting		✓
41	Check alternator and wiring condition		✓
42	On FB4K units with the "dual-gauged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> Create a separate MO to document and use assembly code PEQ-13-008		
43	Check voltage of alternator output and replace if needed		✓
44	Repair any light not working properly. Check condition of reflectors and reflective tape		✓
45	Check wiring for condition, properly routed and secured		✓
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>		✓
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks		✓
48	Check volume tank condition and drain condensate		✓
49	Verify operation of safety valve		✓
50	Check operation and condition of sand screw vibrators		NA
HYDRAULIC SYSTEMS		LH/FT	RH
51	Check for leaks and oil level		✓
52	Check condition of hoses and routing		✓
53	Check hydraulic pumps for leaks and mounting		✓
54	Check hydraulic motors for leaks and mounting		✓
55	Check hydraulic control valves for leaks and mounting		✓
56	Check oil cooler for leaks and condition		✓
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required		✓
58	Check automatic tub level valve for operation		✓
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting		✓
60	Check turbine agitator		✓
61	Check for leaks		✓
62	Check condition of tub screen and bolts.		✓
63	Ensure that all suction and discharge manifold outlets have tethered caps installed		✓
64	Check condition of tub screen and bolts. Refer to bulletin <u>SEQ-08-011</u>		✓

Process Owner, Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

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HESI00240

HALLIBURTON

HRB/Sturvy/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-593B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			✓
66	Check hatch cover for operation and damage			✓
67	Check hatch latching devices for operation and damage			✓
68	Ensure seating surface is clean and gasket is in good condition			✓
69	Check hatch vent for operation and damage			✓
70	Check turbine agitator			✓
71	Check shaft motor coupling			✓
72	Check for leaks			✓
GAUGE PANEL			LH/RT	RH
73	Check panel mounting and latch pins			✓
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			✓
75	Check for secure mounting of attached components			✓
76	Check stairway for operation			N/A
77	Lubricate joints on stair way			/
78	Check hydraulic cylinder for mounting and leaks			/
79	Check fluid level in reservoir			/
80	Check switch connections and mounting			/
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			✓
82	Check cab mounts and condition			✓
83	Check doors, latches and windows			✓
84	Check mounting and condition of instrument panels and cabinets			✓
85	Check for broken switches and gauges			✓
86	Check condition of electrical components			✓
87	Check control stand for secure mounting			✓
88	Check hydraulic controls for leaks and operation			✓
SANDSCREWS				CH
89	Check mounting supports and safety latch.			✓
90	Check sand screw mounting bolts on FB4K for tightness and wear.			✓
91	Check for proper operation.			✓
92	Check for damage or wear.			✓
93	Lubricate all rollers and safety latch.			✓
94	Check valves and hoses on injection system			✓
95	Check mounting of motors.			✓
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw.			✓
97	Check gear box oil level and condition			✓
98	Ensure Hopper Grate is in good condition and bolted in place			✓
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts.			✓
100	Check mounting of micro motion meters and controllers if applicable.			✓
101	Check mounting of pumps, hoses, and encoders or counters.			✓
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate.		✓	✓
103	Check mounts for cracks, wear or missing parts		✓	✓
104	Check for leaks and loose parts		✓	✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00241

HALLIBURTON

HRB/Slurry/FR4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S03B

U-JOINTS AND DRIVE LINES		CH
105	Check U-joints and drive shafts for loose parts or damage	✓
106	Lubricate drive line and u-joints	✓
107	Check guard condition and verify proper and secure mounting	✓
GEAR BOX		LH/FT RH
108	Check mounts.	✓
109	Check oil level and for contamination Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	✓
110	Inspect vents	✓
111	Check gear box for leaks.	✓
CLUTCH AND LINKAGE		LH/FT RH
112	Check clutch and adjust if needed	✓
113	Check linkage for loose or missing parts	✓
114	Lubricate bearing and linkage	✓
CRANE		SUC DIS
115	Check mounting	N/A
116	Check electrical connection	✓
117	Check pinning devices	✓
118	Check for proper operation	✓
119	Check electrical cables and connections	✓
120	Check cable and hook	✓
121	Check for required decals	✓
SACK ELEVATOR		CH
122	Check for proper operation	N/A
123	Check mounting for damage or loose bolts	✓
124	Check chain adjustment	✓
125	Check rollers and slides	✓
CHASSIS COUPLING DEVICES AND LANDING GEAR		CH
126	Check for proper operation	✓
127	Check for damage and wear	✓
128	Check king pin with gauge	N/A
129	Lubricate as required	✓
BLOWER		CH
130	Verify blower is mounted properly and fasteners are secure	✓
131	Check drive coupling for condition and lubrication	✓
132	Lubricate blower box at fittings	✓
133	Check oil level in blower box reservoir	✓
134	Check controls for mounting and operating labels	✓
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	rpm
136	Check air filter, plumbing, and filter housing	✓
137	Check discharge piping and verify valve operation	✓
GENERATOR		CH
138	Check generator for proper operation	✓
139	Check output voltage (120) and hertz (60)	✓
140	Check 110vac lighting system	✓
141	Check for secure mounting	✓
142	Check hydraulic motor coupling	✓
143	Check cables and connections	✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Daweese

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HESI00242

HALLIBURTON

HRB/Slurry/FRAK/GEL PRO Trailer

CL-GL-HAL-1EM-PREV-S93B

IRON AND HOSE RACKS						CH	
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc are held securely in place.					✓	
145	Check for secure mounting of racks and all storage devices					✓	
FRAME AND SUSPENSION						CH	
146	Check all mounts for missing bolts and damage					✓	
147	Check frame for cracks and damage					✓	
148	Check safety guards for secure mounting and placement					✓	
149	Check suspension components					✓	
150	Check bumpers and fenders for mounting and damage					✓	
151	Lubricate chassis and components					✓	
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets.					F	
BRAKES						CH	
153	Check all brake components					NA	
154	Check brake lining condition & thickness $\frac{1}{8}$ " min (6.35mm)						
155	Check brake hoses for certified markings and conditions						
156	Ensure all hoses from valves to spring brakes are wrapped with protective material						
157	Check condition of glad hands						
158	Check brake hoses for routing and supports every 15 inches						
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)						
160	Check brake adjustments using travel method and record measurement						
= Front of Trailer		RF		RM		RR	
		LF		LM		LR	
TIRES AND WHEELS						CH	
161	Inspect wheel hubs and seals, check oil level					✓	
162	Check wheel bearings for excessive play. (Wheel must be off the ground with brakes released)						
163	Check tires per regulatory requirements					✓	
164	Torque all wheels to manufacturers specifications						
	Double Cap Nut Disc Wheel (inner and outer)				450-500 ft-lb		
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)				450-500 ft-lb	✓	
165	Check wheels, rims and mounting					✓	
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")						
= Front of Trailer		Pressure	Tread Depth	Pressure	Tread Depth		
		RMO	100	24	RRO	100	24
		RMI	100	23	RRI	100	24
		LMI	100	23	LRI	100	24
		LMO	100	23	LRO	100	24

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Dewese

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HESI00243

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-593B

ENGINE RUN UP (Indicate units of measure)								CH
167	Check all gauges for functionality and clarity							✓
168	Record voltmeter		Meter 1		Meter 2		27	Volt
169	Record engine oil pressure at 1000 rpm		LH/FRT		RH		48	psi/bar
170	Record air pressure that compressor unloads							psi/bar
171	Record sand screw maximum RPM							rpm
172	Record hydraulic psi:	LH/FRT	RH		Record hydraulic psi:	LH/FRT	RH	psi/bar
	Parallel Charge		5	psi/bar	Suction Centrifugal			psi/bar
	Parallel LA #1		200	psi/bar	Agitator		200	psi/bar
	Parallel LA #2		100	psi/bar	Discharge Centrifugal			psi/bar
	Common Charge			psi/bar	Discharge Cent Charge			psi/bar
	Engine Fan		300	psi/bar	Case Drain		0	psi/bar
	SS#1		200	psi/bar	Return		0	psi/bar
	SS#2		250	psi/bar	Loop		0	psi/bar
173	Record Hydraulic oil temperature							°F
174	Ensure no oil leaks and recheck oil to verify proper level							
ENVIRONMENTAL								CH
175	Dispose of all waste properly. Ensure all spills are cleaned up and properly contained.							✓
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							✓
177	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the <u>ESG Branding web page</u> for guidelines).							✓
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable). Replace sticker if within 90 days of expiration date.				12/2013	Date	
	b	Was a new DOT/CVIP sticker applied? (Circle response)				Yes	No	
	c	Signature: <i>[Signature]</i>					Date	
179	Install new sticker to indicate when the next PM is due							
180	Record date when next PM is due.							Date
181	Record hours/miles/km when next PM is due							Hour/Miles/KM

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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HESI00244

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-993B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	Unit rigged up on frac site did not perform DOT Brake test		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
2	Unit rigged up on frac site did not perform E-kil		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
3	Due to fluid on pad did not grease & inspect Brakes		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
4	No reflective tape on mudflaps		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
5	Did not have time to drain gear box - Frac crew needed unit right away to frac		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
6	Sand screw #2 could grease top grease zirc		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
7	Sand screw #5 couldn't grease top two grease zircs		
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
8			
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
9			
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
10			
	Mechanic name:	Approval acquired:	
	Repair date:	Maintenance order #	
Report any errors found on check sheet to supervisor			

Process Owner, Global Equipment Maintenance Manager

Approver Larry Dewees

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Preventive Maintenance Check Sheet

Revision Date: 3/27/2014

HESI00245

mont

HALLIBURTON

HRB/Shurly/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11149190	2910	Homer City PA	6/14/14
MO# 811724557	V = OK F = Fail (Create RPM order) N/A = not applicable		
Where was PM performed?	Vendor	Shop	Field
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature:			
Employee Name and Number:			Date:
Employee Name and Number:			Date:
Employee Name and Number:			Date:
SAFETY			
1	Lock out tag out unit as per HMS procedures		
2	Conduct safety huddle prior to work to identify safety hazards		
3	Wear appropriate PPE before beginning work.		
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current		
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts	/	
7	Check proper operation of air restriction gauge	/	
8	Replace air filters	/	
9	Inspect to insure air intake covers are in place	/	
10	Test emergency shutdown devices if equipped. A With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch. Engine should stop and rig savers should close. Diagnose and repair savers if they fail to operate properly. For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test: Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B Ensure rig savers are properly latched in the open position after the test.	N/A	
11	Check radiator, mounts, supports and guards	/	
12	Check all hoses, lines and connections for leaks	/	
13	Check radiator for obstruction and condition	/	
14	Check coolant level and protection to minus 34°F (-37°C)	/	
15	Check fan hub and fan assembly for proper operation and condition	/	
16	Check engine cooling system for contamination	/	
17	Check belt condition and adjust if needed	/	
18	Pressure test cooling system and cap	/	
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)	N/A	
20	Change engine oil and filter	/	
21	Collect engine oil samples and submit for analysis	N/A	
22	Check engine lubrication system for leaks or damage	/	
23	Check condition of hot oil hoses	/	

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date: 5/1/2014

HESI00246

HALLEBURTON

HRB/Slurry/FB4K/GEL P.RQ Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks	/	
25	Check fuel tank mounting and condition	/	
26	Check condition of fuel lines	/	
27	Change fuel filters	/	
28	Check fuel cap and vents	/	
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full	NA	
30	Check exhaust system for leaks or damage	/	
31	Check for exhaust system missing parts, loose mounts	/	
32	Check rain cap for proper mounting and operation	/	
33	Check for cracks in muffler flange or mounting	/	
34	Replace open crankcase ventilation filter. SAP part # 101597134 Torque cap to 220 in/lbs	NA	
35	Clean CRS head. SAP part # 101597135	/	
36	Inspect spark plug for carbon build up on CRS head Replace with SAP part # 101597157 if	/	
37	Replace any manifold that is cracked	/	
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed	/	
39	Check cables and wiring for routing and condition	/	
40	Check battery box and cover condition and mounting	/	
41	Check alternator and wiring condition	/	
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> . Create a separate MO to document and use assembly code PEQ-13-008	NA	
43	Check voltage of alternator output and replace if needed	/	
44	Repair any light not working properly. Check condition of reflectors and reflective tape	/	
45	Check wiring for condition, properly routed and secured	/	
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox</u> portal issue 48709	/	
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks	/	
48	Check volume tank condition and drain condensate	/	
49	Verify operation of safety valve	/	
50	Check operation and condition of sand screw vibrators	/	
HYDRAULIC SYSTEMS			CH
51	Check for leaks and oil level	/	
52	Check condition of hoses and routing	/	
53	Check hydraulic pumps for leaks and mounting	/	
54	Check hydraulic motors for leaks and mounting	/	
55	Check hydraulic control valves for leaks and mounting	/	
56	Check oil cooler for leaks and condition	/	
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required	/	
58	Check automatic tub level valve for operation	/	
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting	/	
60	Check turbine agitator	/	
61	Check for leaks	/	
62	Check condition of tub screen and bolts.	/	
63	Ensure that all suction and discharge manifold outlets have tethered caps installed.	/	
64	Check condition of tub screen and bolts. Refer to bulletin <u>SEQ-00-011</u>	/	

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date: 5/1/2014

HESI00247

HALLELUTION

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			/
66	Check hatch cover for operation and damage			/
67	Check hatch latching devices for operation and damage			/
68	Ensure sealing surface is clean and gasket is in good condition			/
69	Check hatch vent for operation and damage			/
70	Check turbine agitator			/
71	Check shaft motor coupling			/
72	Check for leaks			/
GAUGE PANEL			LH/FT	RH
73	Check panel mounting and latch pins		/	
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			/
75	Check for secure mounting of attached components			/
76	Check stairway for operation			/
77	Lubricate joints on stair way			/
78	Check hydraulic cylinder for mounting and leaks			/
79	Check fluid level in reservoir			/
80	Check switch connections and mounting			/
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			/
82	Check cab mounts and condition			/
83	Check doors, latches and windows			/
84	Check mounting and condition of instrument panels and cabinets			/
85	Check for broken switches and gauges			/
86	Check condition of electrical components			/
87	Check control stand for secure mounting			/
88	Check hydraulic controls for leaks and operation			/
SANDSCREWS				CH
89	Check mounting supports and safety latch.			/
90	Check sand screw mounting bolts on FB4K for tightness and wear			/
91	Check for proper operation.			/
92	Check for damage or wear.			/
93	Lubricate all rollers and safety latch.			/
94	Check valves and hoses on injection system			/
95	Check mounting of motors			/
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw.			/
97	Check gear box oil level and condition.			/
98	Ensure Hopper Grate is in good condition and bolted in place			/
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts.			/
100	Check mounting of micro motion meters and controllers if applicable.			/
101	Check mounting of pumps, hoses, and encoders or counters.			/
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate.	/	/	/
103	Check mounts for cracks, wear or missing parts.	/	/	/
104	Check for leaks and loose parts	/	/	/

Process Owner. Global Equipment Maintenance Manager

Approver Larry Dewese

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Preventive Maintenance Check Sheet

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HESI00248

HALLBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

U-JOINTS AND DRIVE LINES			CH
105	Check U-joints and drive shafts for loose parts or damage		/
106	Lubricate drive line and u-joints		/
107	Check guard condition and verify proper and secure mounting		/
GEAR BOX			LH/FT RH
108	Check mounts.	/	
109	Check oil level and for contamination Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	/	
110	Inspect vents.	/	
111	Check gear box for leaks	/	
CLUTCH AND LINKAGE			LH/FT RH
112	Check clutch and adjust if needed	/	
113	Check linkage for loose or missing parts	/	
114	Lubricate bearing and linkage	/	
CRANE			SUC DIS
115	Check mounting	/	
116	Check electrical connection	/	
117	Check pinning devices	/	
118	Check for proper operation	/	
119	Check electrical cables and connections	/	
120	Check cable and hook	/	
121	Check for required decals	/	
SACK ELEVATOR			CH
122	Check for proper operation	/	
123	Check mounting for damage or loose bolts	/	
124	Check chain adjustment	/	
125	Check rollers and slides	/	
CHASSIS COUPLING DEVICES AND LANDING GEAR			CH
126	Check for proper operation	/	
127	Check for damage and wear	/	
128	Check king pin with gauge	Hooked v.g	mt
129	Lubricate as required	/	
BLOWER			CH
130	Verify blower is mounted properly and fasteners are secure	/	
131	Check drive coupling for condition and lubrication	/	
132	Lubricate blower box at fittings	/	
133	Check oil level in blower box reservoir	/	
134	Check controls for mounting and operating labels	/	
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)		rpm
136	Check air filter, plumbing and filter housing	/	
137	Check discharge piping and verify valve operation	/	
GENERATOR			CH
138	Check generator for proper operation	/	
139	Check output voltage (120) and hertz (60)	/	
140	Check 110vac lighting system	/	
141	Check for secure mounting	/	
142	Check hydraulic motor coupling	/	
143	Check cables and connections	/	

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Doweese

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Preventive Maintenance Check Sheet

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HESI00249

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

IRON AND HOSE RACKS							CH
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc. are held securely in place.						/
145	Check for secure mounting of racks and all storage devices						/
FRAME AND SUSPENSION							CH
146	Check all mounts for missing bolts and damage						/
147	Check frame for cracks and damage						/
148	Check safety guards for secure mounting and placement						/
149	Check suspension components						/
150	Check bumpers and fenders for mounting and damage						/
151	Lubricate chassis and components						/
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets.						/
BRAKES							CH
153	Check all brake components						/
154	Check brake lining condition & thickness 1/4" min (6.35mm)						/
155	Check brake hoses for certified markings and conditions						/
156	Ensure all hoses from valves to spring brakes are wrapped with protective material						/
157	Check condition of glad hands						/
158	Check brake hoses for routing and supports every 15 inches						/
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)						M
160	Check brake adjustments using travel method and record measurement						
= Front of Trailer		RF		RM		RR	
		LF		LM		LR	
TIRES AND WHEELS							CH
161	Inspect wheel hubs and seals, check oil level						/
162	Check wheel bearings for excessive play (Wheel must be off the ground with brakes released)						M
163	Check tires per regulatory requirements						/
164	Torque all wheels to manufacturers specifications						/
Double Cap Nut Disc Wheel (inner and outer)				450-500 ft-lb			
Hub Piloted Wheel Mounting (Single Flanged Cap Nut)				450-500 ft-lb			/
165	Check wheels, rims and mounting						/
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")						/
= Front of Trailer			Pressure	Tread Depth		Pressure	Tread Depth
		RMO	120	22	RRO	120	23
		RMI	120	23	RRI	120	23
		LMI	120	23	LRI	120	23
		LMO	120	23	LRO	120	23

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date: 5/1/2014

HESI00250

HALLIBURTON

HRB/Surry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE RUN UP (indicate units of measure)								CH
167	Check all gauges for functionality and clarity							/
168	Record voltmeter		Meter 1	27.9	Meter 2		Volt	
169	Record engine oil pressure at 1000 rpm		LH/FRT	55	RH		psi/bar	
170	Record air pressure that compressor unloads							/
171	Record sand screw maximum RPM							/
172	Record hydraulic psi.	LH/FRT	RH		Record hydraulic psi:	LH/FRT	RH	psi/bar
	Parallel Charge	500		psi/bar	Suction Centrifugal	500		psi/bar
	Parallel LA #1	200		psi/bar	Agitator	200		psi/bar
	Parallel LA #2	100		psi/bar	Discharge Centrifugal	40		psi/bar
	Common Charge			psi/bar	Discharge Cent Charge			psi/bar
	Engine Fan	300		psi/bar	Case Drain	0		psi/bar
	SS#1	200		psi/bar	Return	0		psi/bar
	SS#2	200		psi/bar	Loop	0		psi/bar
173	Record Hydraulic oil temperature							°F
174	Ensure no oil leaks and recheck oil to verify proper level							
ENVIRONMENTAL								CH
175	Dispose of all waste properly. Ensure all spills are cleaned up and properly contained.							/
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc.)							/
177	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the ESG Branding web page for guidelines).							/
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable). Replace sticker if within 90 days of expiration date.				12/13	Date	
	b	Was a new DOT/CVIP sticker applied? (Circle response)				Yes	NO	
	c	Signature:					Date	
179	Install new sticker to indicate when the next PM is due							/
180	Record date when next PM is due							/
181	Record hours/miles/km when next PM is due.							Hour/Miles/KM

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 5/1/2014

HESI00251

HALLIBURTON

HRB/Slurry/EB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	Rain cap broken		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
2			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
3			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
4			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
5			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
6			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
7			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
8			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
9			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
10			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
Report any errors found on check sheet to supervisor			

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00252

	A	B	C	D
46	311580876	11124263	perform daily insp	05/12/2014
47	311593016	11124263	ENGINE RPL FUEL PRESSURE SENSOR	05/14/2014
48	311593018	11124263	LIGHTING SYSTEM RPL LR 120v WORK LIGHT	05/14/2014
49	311593021	11124263	TANK DISP/MIX REP DA #3	05/14/2014
50	311595784	11124263	STARTING SYSTEM JUMP START	05/14/2014
51	311612429	11124263	LA PUMP TS #7	05/14/2014
52	311596232	11124263	DRIVELINE RPL DIRECT DRIVE	05/15/2014
53	311596234	11124263	MIXING SYSTEM RPL 2 LOWER SAND SCREW BEA	05/15/2014
54	311599946	11124263	ELECTRONIC T/S DISCHARGE VALVE FUNCTION	05/15/2014
55	311599949	11124263	ELECTRONIC RPL 5 AMP FUSE HRS 7542	05/15/2014
56	311599950	11124263	ELECTRONIC TESTED OPERATIONS HRS 7542	05/15/2014
57	311612415	11124263	ENGINE RPL AIR FILTERS	05/19/2014
58	311614477	11124263	LIGHTING SYSTEM RPL WORKLIGHTS	05/19/2014
59	311614526	11124263	ELECTRONIC PARKER VALVE RPL	05/19/2014
60	311614529	11124263	TANK DISP/MIX RPL TUB BYPASS LINE	05/19/2014
61	311616143	11124263	MANIFOLD CUSTOM BUILD MANIFOLD	05/19/2014
62	311598831	11124263	Perform S93BPM Inspection 7661 HR	05/21/2014
63	311628025	11124263	ENGINE REP FLY WHEEL	05/21/2014
64	311643834	11124263	ELECTRONIC REP/TS FALSE RATE HRS 7765	05/26/2014
65	311643835	11124263	ELECTRONIC REPLACED TUB LEVEL SENSOR	05/26/2014
66	311649602	11124263	UPDATE FUEL FILTRATION TO FLEETGRD FH239	05/27/2014
67	311659511	11124263	Perform S93BPM Inspection 7818 HR	05/31/2014
68	311709452	11124263	Perform S93BPM Inspection 8091 HR	06/14/2014
69	311795410	11124263	ELECTRONIC REPLACED PAPERWORK DENSO	06/29/2014
70	311591918	11124263	PERFORM E34A PM INSPECTION DESTROYED IN	07/09/2014

	A	B	C	D
1		Equipment	Description	Sched start
2	311333217	11124263	Perform S93BPM Inspection 6822 HRS	04/01/2014
3	311417679	11124263	Replace valves	04/03/2014
4	311417680	11124263	Repair oil leaks	04/03/2014
5	311427108	11124263	Repair grounding cable	04/07/2014
6	311431969	11124263	Perform S93BPM Inspection 7086 HR	04/11/2014
7	311455567	11124263	remove fittings and hoses	04/14/2014
8	311455665	11124263	perform daily insp	04/14/2014
9	311455963	11124263	straightened threads on grease zert 7074	04/14/2014
10	311473586	11124263	put jb weld on pinhole at weld suction s	04/16/2014
11	311484574	11124263	oil leak at pan drain vlv	04/20/2014
12	311485700	11124263	blown fuse for AC fans	04/20/2014
13	311506820	11124263	rear tail lamp inop	04/24/2014
14	311333218	11124263	PERFORM E34A PM INSPECTION 7333 hours	04/25/2014
15	311521321	11124263	ELECTRONIC T/S SUCTION MAG METER	04/26/2014
16	311526855	11124263	TRANSFER SYS RPL DISCHARGE PUMP	04/28/2014
17	311523530	11124263	TRANSFER SYS RPL SAND SCREW	04/29/2014
18	311523531	11124263	TRANSFER SYS RPL SAND SCREW	04/29/2014
19	311527350	11124263	ELEC WLD/DIS	04/29/2014
20	311528584	11124263	DRIVE DEVICES REBUILD F/DRIVE SHAFT	04/29/2014
21	311528585	11124263	STARTING SYS RPL ALTERNATOR BELTS	04/29/2014
22	311528586	11124263	HYD SYS RPL HYDRAULIC FAN PUMP	04/29/2014
23	311528587	11124263	LA SYS REBUILD LA PUMPS	04/29/2014
24	311529448	11124263	MANIFOLD RPL 2",4" VALVES ON DISCHARGE	04/29/2014
25	311529452	11124263	CENTRIFICAL SUCTION TORQUE FLANGE BOLTS	04/29/2014
26	311553100	11124263	MANIFOLD REP LEAKS	04/29/2014
27	311528461	11124263	MANIFOLD REP SUCTION AND DICHARGE MANIFO	04/30/2014
28	311531570	11124263	MIXING SYS REP/RPL TUB AGITATOR	04/30/2014
29	311534472	11124263	FUEL SYS RPL D/S FUEL CAP	04/30/2014
30	311536708	11124263	MANIFOLD RPL DISCHARGE MANIFOLD	04/30/2014
31	311536709	11124263	MIXING SYS RPL 8in TUB LEVELING MANIFOLD	04/30/2014
32	311499470	11124263	Perform S93C2 PM Inspection 7334 HR	05/01/2014
33	311536696	11124263	FLOW METER RPL 8in FLOW METER	05/01/2014
34	311536763	11124263	RPL RAIN CAP	05/01/2014
35	311538222	11124263	HYD SYS RPL HYD FAN MOTOR	05/01/2014
36	311538241	11124263	WHEELS RPL P/S FRONT AXLE WHEEL SEAL/BEA	05/01/2014
37	311538348	11124263	SAFETY GRP RPL 2 FIRE EXTINGUISHERS	05/01/2014
38	311540129	11124263	STARTING SYS RPL ALTERNATORS	05/02/2014
39	311540526	11124263	TANK DISP/MIX RPL AGITATOR	05/02/2014
40	311540529	11124263	ELECTRONIC REPL MAG PICKUP HRS 7334	05/02/2014
41	311543020	11124263	LIGHT SYS RPL APPLETON WORK LIGHT	05/02/2014
42	311543148	11124263	ADD CASE DRAIN LINES TO FB4K BLENDERS	05/02/2014
43	311545260	11124263	LIGHTING SYSTEM REP MARKER LIGHTS	05/03/2014
44	311578149	11124263	eng rpr fix leak at pan drain valve	05/11/2014
45	311579152	11124263	direct drive locked up 7537	05/12/2014

	A	B	C	D
1	Equipment	Description	Sched start	
2	311401630	11149190	ELEC RPL DRYADD FLEXIBLE COUPLING	04/01/2014
3	311414792	11149190	* ELEC REP DISCHARGE HYD PRESSURE READI	04/03/2014
4	311414793	11149190	ELEC REP SUCTION HYD PRESSURE READING	04/03/2014
5	311400639	11149190	PERFORM S93B PM INSPECTION 2113 HRS	04/05/2014
6	311422246	11149190	MIXING SYSTEM REP SAND SCREWS	04/05/2014
7	311425450	11149190	TANKS DISPLACE /MIX REP DISCHARGE MANIFO	04/06/2014
8	311428991	11149190	LIGHTING SYSTEM REP WORK LIGHTS	04/07/2014
9	311428992	11149190	TANK DISP/MIX REP DA #3	04/07/2014
10	311432313	11149190	LIGHTING SYSTEM RPL MARKER LIGHT	04/08/2014
11	311432314	11149190	ENGINE RPL RIG SAVER	04/08/2014
12	311432321	11149190	HYDRAULIC SYSTEM RPL SWAPPED LINES	04/08/2014
13	311432322	11149190	LA PUMP 7 REP	04/08/2014
14	311432913	11149190	TANK DISP/MIX RPL OBERDORFER PUMP	04/08/2014
15	311436463	11149190	HYDRAULIC SYSTEM REP LEAK ON HOSE	04/09/2014
16	311437572	11149190	HYDRAULIC SYSTEM ADJUST DRY ADD SPEEDS	04/09/2014
17	311442119	11149190	ELECTRONIC RPL IMAGE	04/09/2014
18	311442120	11149190	ELECTRONIC UPGRADE ACE	04/09/2014
19	311498664	11149190	SAFETY GRP/SAND SCREW COVER	04/23/2014
20	311512080	11149190	ELECTRONIC RPL SUCTION HYD PRESSURE TRA	04/25/2014
21	311512081	11149190	ELECTRONIC RPL DISCHARGE HYD PRESSURE T	04/25/2014
22	311521317	11149190	ELECTRONIC VERIFIED SETTINGS <{>&<> CAL	04/26/2014
23	311518523	11149190	Troubleshoot TFM	04/27/2014
24	311536707	11149190	MANIFOLD REMOVE DISCHARGE MANIFOLD	04/30/2014
25	311543505	11149190	ADD CASE DRAIN LINES TO FB4K BLENDERS	05/02/2014
26	311545259	11149190	HYDRAULIC SYSTEM RPL FAN MOTOR	05/03/2014
27	311545850	11149190	CENTRIFICAL PUMP RPL COUPLER DISCHARGE P	05/03/2014
28	311547923	11149190	TANK DISP/MIX REMOVE DESOMETER FOR TRAVE	05/04/2014
29	311590205	11149190	ELECTRONIC TEST OPERATIONS	05/13/2014
30	311590206	11149190	ELECTRONIC T/S LA2 OPERATIONS	05/13/2014
31	311590207	11149190	ELECTRONIC AUTOTUNE SANDSCREWS	05/13/2014
32	311612416	11149190	ENGINE RPL AIR FILTERS	05/19/2014
33	311598832	11149190	PERFORM S93BPM INSPECTION 2448 HR	05/21/2014
34	311629457	11149190	ELECTRONIC REPLACED KEYBOARD HRS 2448	05/22/2014
35	311646660	11149190	ELECTRONIC RPL CONTROL SWITCH HRS2559	05/27/2014
36	311647791	11149190	LIGHTING SYSTEM RPL WORKLIGHTS	05/27/2014
37	311649603	11149190	UPDATE FUEL FILTRATION TO FLEETGRD FH239	05/27/2014
38	311657892	11149190	TANK DISP/MIX RPL 8" VALVES	05/29/2014
39	311602578	11149190	PERFORM E34A PM INSPECTION HRS 2594	05/30/2014
40	311659512	11149190	PERFORM S93BPM INSPECTION 2623 HR	06/01/2014
41	311724557	11149190	PERFORM S93BPM INSPECTION 2910 HR	06/14/2014
42	311795408	11149190	ELECTRONIC REPLACED PAPERWORK DENSO	06/29/2014
43	311667794	11149190	PERFORM E34A PM INSPECTION	07/29/2014

PRELIMINARY FIELD SERVICE REPORT

Location:

HALLBURTON - Carmichaels
1614 E. ROY E. FURMAN HWY
CARMICHAELS PA 15320

FSR Number: 25964
Maint Order #: 311431969
Start Time: 4/11/2014 3.05 PM

PM: B Unit Code: S93 CleanUp PM:

2007 Cat Blender (S93)

Unit #: 11124263

VIN #: 1M91H40207A211450

Tag #: 2654JJ

Mileage:

Engine Hours: 7086.00

CREW: Philip Frazier, Cody Palmer, Kenneth Stewart

SERVICES PROVIDED

B AUXILIARY COMPONENT INSPECTION

B BRAKE INSPECT / ADJUST

B ENGINE OIL D&F

Qty 76 CHEVRON - CHEV15/40H

B REPLACE AIR FILTER(S)

Qty 2 FLEETGUARD - AF4609

Qty 2 FLEETGUARD - AF4874

B REPLACE FUEL FILTER(S)

Qty 2 CAT - 1R0755

Qty 1 CAT - 3261643

B REPLACE HYDRAULIC FILTER(S)

Qty 4 FLEETGUARD - HF35000

B REPLACE OIL FILTER(S)

Qty 2 CAT - 2752604

B TORQUE LUGS

FLUID LEVEL CHECKS/TOPOFFS

Fluid	Initial Level	Qty	Description
Engine Oil	FULL		
Gear/Drop Box DS/F	FULL		
Hydraulic Fluid (TopOff)	LOW	32.00	CHEVRON HD 389 HAL (TX/OK)
Radiator Coolant DS/F	FULL		
Zircs	DONE	61.00	

Engine Run-Ups

Engine 1 Run-Up

Engine Idle	RPM	700	PSI	60
Engine With	1000	RPM	PSI	65
Engine Max Run-Up	RPM	2128	PSI	82

Engine 2 Run-Up

Engine Idle	RPM	N/A	PSI	N/A
Engine With	1000	RPM	PSI	65
Engine Max Run-Up	RPM	N/A	PSI	N/A

HESI00256

TIRES/BRAKES

PSI:

	100	100	
	100	100	
	100	100	
	100	100	

BRAKE LINING:

	18	18	
	18	18	

TREAD 32nd:

	22	22	
	22	22	
	22	22	
	22	22	

SLACK TRAVEL:

	1.50	1.50	
	1.50	1.50	

HALLIBURTON

HRB/Slurry/EB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11124263	7086	Homer City PA	4-11-14
MO# 311431969 V = OK F = Fail (Create RPM order) N/A = not applicable			
Where was PM performed?		Vendor <input checked="" type="checkbox"/> Shop <input type="checkbox"/> Field <input type="checkbox"/>	
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature:			
Employee Name and Number: <u>Peter Scott</u>		Date <u>4-11-14</u>	
Employee Name and Number:		Date:	
Employee Name and Number:		Date:	
SAFETY			
1	Lock out tag out units as per HMS procedures.		<input checked="" type="checkbox"/>
2	Conduct safety huddle prior to work to identify safety hazards		<input checked="" type="checkbox"/>
3	Wear appropriate PPE before beginning work.		<input checked="" type="checkbox"/>
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		<input checked="" type="checkbox"/>
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current		<input checked="" type="checkbox"/>
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	Check proper operation of air restriction gauge	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	Replace air filters	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	Inspect to insure air intake covers are in place	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Test emergency shutdown devices if equipped. A. With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch. Engine should stop and rig savers should close. Diagnose and repair savers if they fail to operate properly. For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test: Activate the engine over speed function in the CAT ET. Slowly increase engine rpm until rig saver activates. B. Ensure rig savers are properly latched in the open position after the test.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	Check radiator, mounts, supports and guards	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12	Check all hoses, lines and connections for leaks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	Check radiator for obstruction and condition	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	Check coolant level and protection to minus 34°F (-37°C)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	Check fan hub and fan assembly for proper operation and condition	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
16	Check engine cooling system for contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17	Check belt condition and adjust if needed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
18	Pressure test cooling system and cap	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
20	Change engine oil and filter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
21	Collect engine oil samples and submit for analysis	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
22	Check engine lubrication system for leaks or damage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
23	Check condition of hot oil hoses	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Dewese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

HESI00258

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks	✓	✓
25	Check fuel tank mounting and condition		✓
26	Check condition of fuel lines		✓
27	Change fuel filters		✓
28	Check fuel cap and vents		✓
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full		✓
30	Check exhaust system for leaks or damage		✓
31	Check for exhaust system missing parts, loose mounts		✓
32	Check rain cap for proper mounting and operation		✓
33	Check for cracks in muffler flange or mounting		✓
34	Replace open crankcase ventilation filter SAP part # 101597134 Torque cap to 220 in/lbs		✓
35	Clean CRS head SAP part # 101597135		✓
36	Inspect spark plug for carbon build up on CRS head. Replace with SAP part # 101597157 if		✓
37	Replace any manifold that is cracked		✓
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed		✓
39	Check cables and wiring for routing and condition		✓
40	Check battery box and cover condition and mounting		✓
41	Check alternator and wiring condition		✓
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> . Create a separate MO to document and use assembly code PEQ-13-008		✓
43	Check voltage of alternator output and replace if needed		✓
44	Repair any light not working properly Check condition of reflectors and reflective tape		✓
45	Check wiring for condition, properly routed and secured		✓
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>		✓
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks		✓
48	Check volume tank condition and drain condensate		✓
49	Verify operation of safety valve		✓
50	Check operation and condition of sand screw vibrators		✓
HYDRAULIC SYSTEMS		LH/FT	RH
51	Check for leaks and oil level	✓	✓
52	Check condition of hoses and routing		✓
53	Check hydraulic pumps for leaks and mounting		✓
54	Check hydraulic motors for leaks and mounting		✓
55	Check hydraulic control valves for leaks and mounting		✓
56	Check oil cooler for leaks and condition		✓
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required		✓
58	Check automatic tub level valve for operation		✓
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting		✓
60	Check turbine agitator		✓
61	Check for leaks		✓
62	Check condition of tub screen and bolts.		✓
63	Ensure that all suction and discharge manifold outlets have tethered caps installed.		✓
64	Check condition of tub screen and bolts. Refer to bulletin <u>SEQ-00-011</u>		✓

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date: 3/27/2014

HESI00259

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			✓
66	Check hatch cover for operation and damage			✓
67	Check hatch latching devices for operation and damage			✓
68	Ensure sealing surface is clean and gasket is in good condition			✓
69	Check hatch vent for operation and damage			✓
70	Check turbine agitator			✓
71	Check shaft motor coupling			✓
72	Check for leaks			✓
GAUGE PANEL			LH/FT	RH
73	Check panel mounting and latch pins		✓	✓
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			✓
75	Check for secure mounting of attached components			✓
76	Check stairway for operation			✓
77	Lubricate joints on stair way			✓
78	Check hydraulic cylinder for mounting and leaks			✓
79	Check fluid level in reservoir			✓
80	Check switch connections and mounting			✓
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			✓
82	Check cab mounts and condition			✓
83	Check doors, latches and windows			✓
84	Check mounting and condition of instrument panels and cabinets			✓
85	Check for broken switches and gauges			✓
86	Check condition of electrical components			✓
87	Check control stand for secure mounting			✓
88	Check hydraulic controls for leaks and operation			✓
SANDSCREWS				CH
89	Check mounting supports and safety latch.			✓
90	Check sand screw mounting bolts on FB4K for tightness and wear			✓
91	Check for proper operation			✓
92	Check for damage or wear			✓
93	Lubricate all rollers and safety latch.			✓
94	Check valves and hoses on injection system			✓
95	Check mounting of motors			✓
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw			✓
97	Check gear box oil level and condition			✓
98	Ensure Hopper Grate is in good condition and bolted in place			✓
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts			✓
100	Check mounting of micro motion meters and controllers if applicable			✓
101	Check mounting of pumps, hoses, and encoders or counters			✓
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate.	✓	✓	✓
103	Check mounts for cracks, wear or missing parts	✓	✓	✓
104	Check for leaks and loose parts.	✓	✓	✓

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

HESI00260

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

U-JOINTS AND DRIVE LINES		CH
105	Check U-joints and drive shafts for loose parts or damage	✓
106	Lubricate drive line and u-joints	✓
107	Check guard condition and verify proper and secure mounting	✓
GEAR BOX		LH/FT RH
108	Check mounts	✓
109	Check oil level and for contamination Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	✓
110	Inspect vents	✓
111	Check gear box for leaks	✓
CLUTCH AND LINKAGE		LH/FT RH
112	Check clutch and adjust if needed	✓
113	Check linkage for loose or missing parts	✓
114	Lubricate bearing and linkage	✓
CRANE		SUC DIS
115	Check mounting	✓
116	Check electrical connection	✓
117	Check pinning devices	✓
118	Check for proper operation	✓
119	Check electrical cables and connections	✓
120	Check cable and hook	✓
121	Check for required decals	✓
SACK ELEVATOR		CH
122	Check for proper operation	✓
123	Check mounting for damage or loose bolts	✓
124	Check chain adjustment	✓
125	Check rollers and slides	✓
CHASSIS COUPLING DEVICES AND LANDING GEAR		CH
126	Check for proper operation	✓
127	Check for damage and wear	✓
128	Check king pin with gauge	✓
129	Lubricate as required	✓
BLOWER		CH
130	Verify blower is mounted properly and fasteners are secure	✓
131	Check drive coupling for condition and lubrication	✓
132	Lubricate blower box at fittings	✓
133	Check oil level in blower box reservoir	✓
134	Check controls for mounting and operating labels	✓
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	rpm
136	Check air filter, plumbing, and filter housing	✓
137	Check discharge piping and verify valve operation	✓
GENERATOR		CH
138	Check generator for proper operation	✓
139	Check output voltage (120) and hertz (60)	✓
140	Check 110vac lighting system	✓
141	Check for secure mounting	✓
142	Check hydraulic motor coupling	✓
143	Check cables and connections	✓

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

HESI00261

HALLIBURTON

HRB/Slurry/FR4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

IRON AND HOSE RACKS							CH
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc. are held securely in place.						✓
145	Check for secure mounting of racks and all storage devices.						✓
FRAME AND SUSPENSION							CH
146	Check all mounts for missing bolts and damage.						✓
147	Check frame for cracks and damage.						✓
148	Check safety guards for secure mounting and placement.						✓
149	Check suspension components.						✓
150	Check bumpers and fenders for mounting and damage.						✓
151	Lubricate chassis and components.						✓
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets.						✓
BRAKES							CH
153	Check all brake components.						✓
154	Check brake lining condition & thickness 1/4" min (6.35mm).						✓
155	Check brake hoses for certified markings and conditions.						✓
156	Ensure all hoses from valves to spring brakes are wrapped with protective material.						✓
157	Check condition of glad hands.						✓
158	Check brake hoses for routing and supports every 15 inches.						✓
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves).						✓
160	Check brake adjustments using travel method and record measurement.						✓
⇐ Front of Trailer		RF	1.5	RM	1.5	RR	✓
		LF	1.5	LM	1.5	LR	
TIRES AND WHEELS							CH
161	Inspect wheel hubs and seals, check oil level.						✓
162	Check wheel bearings for excessive play (Wheel must be off the ground with brakes released).						✓
163	Check tires per regulatory requirements.						✓
164	Torque all wheels to manufacturers specifications.						✓
	Double Cap Nut Disc Wheel (inner and outer)				450-500 ft-lb	✓	
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)				450-500 ft-lb	✓	
165	Check wheels, rims and mounting.						✓
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32").						✓
⇐ Front of Trailer			Pressure	Tread Depth		Pressure	Tread Depth
		RMO	100	22	RRO	100	22
		RMI	100	22	RRI	100	22
		LMI	100	22	LRI	100	22
		LMO	100	22	LRO	100	22

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 3/27/2014

HESI00262

HALLIBURTON

HRB/Slurry/EB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

ENGINE RUN UP (indicate units of measure)								CH
167	Check all gauges for functionality and clarity							
168	Record voltmeter		Meter 1		Meter 2			Volt
169	Record engine oil pressure at 1000 rpm		LH/FRT		RH			psi/bar
170	Record air pressure that compressor unloads							psi/bar
171	Record sand screw maximum RPM							rpm
172	Record hydraulic psi	LH/FRT	RH		Record hydraulic psi	LH/FRT	RH	psi/bar
	Parallel Charge			psi/bar	Suction Centrifugal			psi/bar
	Parallel LA #1			psi/bar	Agitator			psi/bar
	Parallel LA #2			psi/bar	Discharge Centrifugal			psi/bar
	Common Charge			psi/bar	Discharge Cent Charge			psi/bar
	Engine Fan			psi/bar	Case Drain			psi/bar
	SS#1			psi/bar	Return			psi/bar
	SS#2			psi/bar	Loop			psi/bar
173	Record Hydraulic oil temperature							°F
174	Ensure no oil leaks and recheck oil to verify proper level							
ENVIRONMENTAL								CH
175	Dispose of all waste properly Ensure all spills are cleaned up and properly contained.							
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							
177	Verify that proper company logos and decals are installed as per the Branding initiative Verify that the SAP equipment number is clearly marked on the unit (see the ESG Branding web page for guidelines).							
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable). Replace sticker if within 90 days of expiration date						Date
	b	Was a new DOT/CVIP sticker applied? (Circle response)				Yes	No	
	c	Signature						Date
179	Install new sticker to indicate when the next PM is due							
180	Record date when next PM is due.							Date
181	Record hours/miles/km when next PM is due							Hour/Miles/KM

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 3/27/2014

HESI00263

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1			
	Mechanic name.	Approval acquired	
	Repair date.	Maintenance order #	
2			
	Mechanic name.	Approval acquired	
	Repair date	Maintenance order #	
3			
	Mechanic name	Approval acquired	
	Repair date.	Maintenance order #	
4			
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
5			
	Mechanic name:	Approval acquired.	
	Repair date	Maintenance order #	
6			
	Mechanic name	Approval acquired:	
	Repair date	Maintenance order #	
7			
	Mechanic name.	Approval acquired	
	Repair date	Maintenance order #	
8			
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
9			
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
10			
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #:	

Report any errors found on check sheet to supervisor

Process Owner Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

HESI00264

MSC 2
30

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11124263	7333	HCB4	4/29/14
MO# 311199470	V = OK F = Fail (Create RPM order) N/A = not applicable		
Where was PM performed?	Vendor	Shop	Field
Check SAP maintenance order history for component replacement/recent repairs as required			
Check for technical bulletin updates. Check for latest OEM ECM updates			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396 17 (USA only) Mechanic signature			
Employee Name and Number	C. B. Lamm 585577	Date	4/29/14
Employee Name and Number	D. Rapack 433469	Date	4-29-14
Employee Name and Number	C. Crossin - 533039	Date	4-29-14
SAFETY			
1	**** Lock out tag out unit as per HMS procedures. ****		✓
2	Conduct safety huddle prior to work to identify safety hazards		✓
3	Wear appropriate PPE before beginning work.		✓
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		CB
5	Check for current inspection date on fire extinguisher. Replace fire extinguisher if not current		CB
ENGINE INSPECTION			LH/FT RH
6	Replace engine if engine hours exceed 10,000 hours 5000 hours for Detroit		NA
7	Remove radiator and have cleaned at approved radiator shop		
8	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts		CB
9	Replace air restriction gauge		CB
10	Replace air filters		CB
11	Inspect to insure air intake covers are in place		CB
12	Test emergency shutdown devices if equipped. A. With engine water temperature at least 100° F, and engine operating at 1000 RPM, activate emergency kill switch Engine should stop and rig savers should close Diagnose and repair savers if they fail to operate properly For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test: Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B. Ensure rig savers are properly latched in the open position after the test		
13	Check radiator, mounts, supports and guards		CB
14	Change all coolant hoses and check lines and connections for leaks "Hose are Good"		CC
15	Change coolant and ensure protection to minus 34° F (-37° C) (Coolant is Good)		CC
16	Pressure test cooling system and cap		CC
17	Check pH and SCA and adjust as necessary (Non ELC coolant only)		CC
18	Change engine oil and filters		CB
19	Collect engine oil samples and submit for analysis		
20	Check engine lubrication system for leaks or damage		CB
21	Check condition of hot oil hoses		CB
22	Check fuel system for leaks		CB
23	Check fuel tank mounting and condition		CB

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check condition of steel fuel lines		CB
25	Check condition of fuel lines		CB
26	Change fuel filters		CB
27	Check fuel cap and vents		CB
28	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full		—
29	Check exhaust system for leaks or damage		F
30	Check for exhaust system missing parts, loose mounts		CC
31	Check rain cap for proper mounting and operation		F
32	Check for cracks in muffler flange or mounting		CC
33	Replace open crankcase ventilation filter SAP part # 101597134 Torque cap to 220 in/lbs		—
34	Clean CRS head SAP part # 101597135		A
35	Inspect spark plug for carbon build up on CRS head Replace with SAP part # 101597157 if necessary		2
36	Replace any manifold that is cracked		CC
37	Check and adjust overhead as per OEM service manual guidelines		
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed		CB
39	Check cables and wiring for routing and condition		CB
40	Check battery box and cover condition and mounting		CB
41	Replace alternators and belts		CB
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> Create a separate MO to document and use assembly code PEQ-13-008		N/A
43	Check voltage of alternator output and replace if needed		
44	Repair any light not working properly. Check condition of reflectors and reflective tape		F
45	Check wiring for condition, properly routed and secured		CB
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>		CB
AUXILIARY AIR SYSTEM			CH
47	Replace air compressor		
48	Check for leaks and service dryers		
49	Check volume tank condition and drain condensate		
50	Verify operation of safety valve		
51	Check operation and condition of sand screw vibrators		
HYDRAULIC SYSTEMS		LH/FT	RH
52	Check for leaks and oil level		
53	Check condition of hoses and routing		CB
54	Check hydraulic pumps for leaks and mounting		CB
55	Check hydraulic motors for leaks and mounting		F
56	Check hydraulic control valves for leaks and mounting		CB
57	Check oil cooler for leaks and condition		CB
58	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required		CB
59	Check automatic tub level valve for operation		CB

BLENDING TUB AND MANIFOLD		CH
60	Check tub mounting	CL
61	Check turbine agitator	F
62	Check for leaks	CL
63	Check condition of tub screen and bolts	F
64	Ensure that all suction and discharge manifold outlets have tethered caps installed	
65	Check condition of tub screen and bolts Refer to bulletin SEQ-00-011	CC
GEL STORAGE/HYDRATION TANK		CH
66	Check mounting	CB
67	Check hatch cover for operation and damage	CB
68	Check hatch latching devices for operation and damage	CB
69	Ensure sealing surface is clean and gasket is in good condition	CB
70	Check hatch vent for operation and damage	CB
71	Check turbine agitator	TO
72	Check shaft motor coupling	TO
73	Check for leaks	TO
GAUGE PANEL		LH/FT RH
74	Check panel mounting and latch pins	CB
WALKWAY AND SUPPORTS		CH
75	Check all mounting for cracks and damage	CC
76	Check for secure mounting of attached components	CC
77	Check stairway for operation	CC
78	Lubricate joints on stair way	CC
79	Check hydraulic cylinder for mounting and leaks	CC
80	Check fluid level in reservoir	NA
81	Check switch connections and mounting	NA
CONTROL HOUSE/STANDS		CH
82	Check operation of throttles	CB
83	Check cab mounts and condition	CB
84	Check doors, latches and windows	CB
85	Check mounting and condition of Instrument panels and cabinets	CB
86	Check for broken switches and gauges	CB
87	Check condition of electrical components	CB
88	Check control stand for secure mounting	CB
89	Check hydraulic controls for leaks and operation	CB
SANDSCREWS		CH
90	Check mounting supports and safety latch.	CK
91	Check sand screw mounting bolts on FB4K for tightness and wear	CK
92	Check for proper operation.	CB
93	Check for damage or wear.	F
94	Lubricate all rollers and safety latch	CK
95	Check valves and hoses on injection system	CK
96	Check mounting of motors.	CK
DRY ADDITIVE SYSTEM		CH
97	Check condition of feeder and screw	
98	Check gear box oil level and condition.	
99	Ensure Hopper Grate is in good condition and bolted in place	

HALLIBURTON

HR8/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93C2

CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
100	Check condition of tanks, connection, hose and mounts			
101	Check mounting of micro motion meters and controllers if applicable			
102	Check mounting of pumps, hoses, and encoders or counters			
CENTRIFUGAL PUMPS			REC	SUC
103	Check oil level in pumps and lubricate.			TO
104	Check mounts for cracks, wear or missing parts.			TO
105	Check for leaks and loose parts			TO
106	Disassemble and inspect Waldren couplings			TO
U-JOINTS AND DRIVE LINES				CH
107	Replace or rebuild drive lines Rebuild Front drive shaft			CS
108	Replace u-joints			CB
109	Check guard condition and verify proper and secure mounting			CS
GEAR BOX			LH/FT	RH
110	Check mounts			CB
111	Check oil level and for contamination Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286 GSS Replace oil			CB
112	Inspect vents.			CS
113	Check gear box for leaks			CB
CLUTCH AND LINKAGE			LH/FT	RH
114	Check clutch and adjust if needed			✓
115	Check linkage for loose or missing parts			A
116	Lubricate bearing and linkage			
CRANE			SUC	DIS
117	Check mounting			X
118	Check electrical connection			X
119	Check pinning devices			X
120	Check for proper operation			X
121	Check electrical cables and connections			X
122	Check cable and hook			X
123	Check for required decals			X
SACK ELEVATOR				CH
124	Check for proper operation			X
125	Check mounting for damage or loose bolts			X
126	Check chain adjustment			X
127	Check rollers and slides			X
CHASSIS COUPLING DEVICES AND LANDING GEAR				CH
128	Check for proper operation			DH
129	Check for damage and wear			DH
130	Check king pin with gauge			DH
131	Lubricate as required			DH

Process Owner Global Equipment Maintenance Manager

Approver: Larry Dewese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

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BLOWER							CH
132	Verify blower is mounted properly and fasteners are secure						g3
133	Check drive coupling for condition and lubrication						g3
134	Lubricate blower box at fittings						g3
135	Check oil level in blower box reservoir						g3
136	Check controls for mounting and operating labels						g3
137	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)						rpm
138	Check air filter, plumbing, and filter housing						g3
139	Check discharge piping and verify valve operation						
GENERATOR							CH
140	Check generator for proper operation						g3
141	Check output voltage (120) and hertz (60)						g3
142	Check 110vac lighting system						g3
143	Check for secure mounting						g3
144	Check hydraulic motor coupling						g3
145	Check cables and connections						g3
IRON AND HOSE RACKS							CH
146	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc. are held securely in place.						X
147	Check for secure mounting of racks and all storage devices						X
FRAME AND SUSPENSION							CH
148	Check all mounts for missing bolts and damage						OH
149	Check frame for cracks and damage						OH
150	Check safety guards for secure mounting and placement						OH
151	Check suspension components						OH
152	Check bumpers and fenders for mounting and damage						OH
153	Lubricate chassis and components						X
154	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets. (RELEASED)						N/A
BRAKES							CH
155	Check all brake components						g3
156	Check brake lining condition & thickness 1/4" min (6.35mm)						g3
157	Replace all brake hoses. NOTE: Replacement air brake hose must meet the requirements of Federal Motor Vehicle Safety Standards (FMVSS)/U.S. Department of Transportation (DOT) standards 49CFR571.106. Replacement brake hose should be the same size and length as the hose assemblies originally supplied on the equipment.						2/4
158	Check brake hoses for certified markings and conditions						g3
159	Ensure all hoses from valves to spring brakes are wrapped with protective material						g3
160	Check condition of glad hands						F
161	Check brake hoses for routing and supports every 15 inches						g3
162	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)						
163	Check brake adjustments using travel method and record measurement						g3
← Front of Trailer		RF	Y2	RM	X	RR	Y2
		LF	Y2	LM		LR	Y2

TIRES AND WHEELS										CH					
164	Inspect wheel hubs and seals, check oil level									CB					
165	Check wheel bearings for excessive play. (Wheel must be off the ground with brakes released)									CB					
166	Check tires per regulatory requirements									CB					
167	Torque all wheels to manufacturers specifications									CB					
	Double Cap Nut Disc Wheel (inner and outer)						460-500 ft-lb								
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)						450-500 ft-lb		CB						
168	Check wheels, rims and mounting									CB					
169	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")									CB					
<div style="text-align: center;"> <p>← Front of Trailer</p> </div>															
											Pressure	Tread Depth		Pressure	Tread Depth
										RMO	100	14/32	RRO	100	16/32
										RMI	100	14	RRI	100	16
										LMI	100	16	LRI	100	16
	LMO	100	16	LRO	100	16									
ENGINE RUN UP (indicate units of measure)										CH					
170	Check all gauges for functionality and clarity									CB					
171	Record voltmeter				Meter 1	27.4	Meter 2	27.4	Volt						
172	Record engine oil pressure at 1000 rpm				LH/FRT		RH		psi/bar						
173	Record air pressure that compressor unloads								psi/bar						
174	Record sand screw maximum RPM								rpm						
175	Record hydraulic psi	LH/FRT	RH		Record hydraulic psi	LH/FRT	RH		psi/bar						
	Parallel Charge	1500			Suction Centrifugal				psi/bar						
	Parallel LA #1				Agitator				psi/bar						
	Parallel LA #2				Discharge Centrifugal				psi/bar						
	Common Charge				Discharge Cent Charge				psi/bar						
	Engine Fan				Case Drain				psi/bar						
	SS#1		CB		Return				psi/bar						
	SS#2		CB		Loop				psi/bar						
176	Record Hydraulic oil temperature									°F					
177	Ensure no oil leaks and recheck oil to verify proper level														
ENVIRONMENTAL										CH					
178	Dispose of all waste properly Ensure all spills are cleaned up and properly contained														
REQUIRED PAPER WORK															
179	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc.)									CB					
180	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the ESG Branding web page for guidelines)									CB					
181	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable) Replace sticker if within 90 days of expiration date.						Dec 2013	Date						
	b	Was a new DOT/CVIP sticker applied? (Circle response)						Yes	No						
	c	Signature							Date						
182	Install new sticker to indicate when the next PM is due														
183	Record date when next PM is due.									Date					
184	Record hours/miles/km when next PM is due									Hour/Miles/KM					

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
 Revision Date: 3/27/2013

HESI00270

Required Cab Paper Work Checksheet

☒ **Current Vehicle Registration**

☐ **Proof of Insurance Form**

☐ **Federal Hazmat Form (Placard Vehicles Only)**

☐ **Uniform Permit of Ohio, Nevada, West Virginia (Placard vehicles only)**

☐ **State Inspection Sticker (Where states require)**

Check all door emblems, USDOT numbers to insure that they are in good shape.

Check IFTA sticker is current

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	Discharge pump needs Replaced		
✓	Mechanic name	YD AM	Approval acquired
	Repair date		Maintenance order #
2	D/S sand screw needs replaced		
✓	Mechanic name	C. Clossin	Approval acquired
	Repair date	4-29-14	Maintenance order #
3	Bolts need Tightened on Suction pump		
✓	Mechanic name	C. Clossin	Approval acquired
	Repair date	4-29-14	Maintenance order #
4	HYD Pump for Front Fan Needs Replaced		
✓	Mechanic name	C. Clossin	Approval acquired
	Repair date	4/30/14	Maintenance order #
5	Rain Cap is missing on Muffler		
✓	Mechanic name	C. Clossin	Approval acquired
	Repair date	5/1/14	Maintenance order #
6	Heat shield on Exhaust Need Put Back in Place		
	Repair not needed		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
7	Repair not needed		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
8	Rad Needs Cleaned		
✓	Mechanic name	YD AM	Approval acquired
	Repair date		Maintenance order #
9	Front Fan Motor is Wet.		
✓	Mechanic name	C. Clossin	Approval acquired
	Repair date	5/1/14	Maintenance order #
10	Reflector tape on Both Rear Fenders Needs Replaced and		
✓	Mechanic name	L. ALLOW	Approval acquired
	Repair date	5.2.14	Maintenance order #

Report any errors found on check sheet to supervisor

✓ 11) tub agitator is missing a Paddle

((Turn over))

LOCKOUT/TAGOUT CHECKLIST #1
Heavy duty vehicular power Units i.e. tractors, forklifts, bodyloads, etc.

Unit # 11124263 Workorder # 311499470
Date 4/29/14 Location of Work HC84
Description of Work PM / RPMs
Authorized Employee C. Brown Emp # 350677

- All affected employee(s) informed of lockout / tagout Yes ☒ No ☐
ALLOW 04.30.2014
1. Choke / Block wheels as appropriate. Yes ☒ No ☐
ALLOW 05.01.2014
2. Attach keys to cab with multi-lock adapter Yes ☒ No ☐
ALLOW 05.02.2014 509903
3. Perform diagnostics as required to identify repair or maintenance need. Yes ☒ No ☐

AFTER DIAGNOSTICS HAVE BEEN COMPLETED

4. Bleed off all air systems to zero PSI by venting main air tanks. Yes ☒ No ☐
5. Disconnect positive battery cable. Yes ☒ No ☐
6. Place LOCK and TAG on disconnected battery cables. Yes ☒ No ☐

PERFORM WORK AS REQUIRED

RESTART AFTER MAINTENANCE IS COMPLETE

- Machine and area clear of tools and equipment after work completed? Yes ☐ No ☐
All personnel cleared from machine or equipment prior to re-energizing? Yes ☐ No ☐
Contractor personnel informed of lockout/tagout procedures? Yes ☐ No ☐ N/A ☒
All replacement personnel informed of lockout/tagout status at shift change? Yes ☐ No ☐ N/A ☒

Caution – Some machines or equipment may have secondary power sources and/or residual energy may be present. Consult C6S2 or your supervisor for guidance in identifying suspected secondary residual energy sources and implementing controls as needed.

Awareness Reminders:

Thermal – Assure radiator and/or hydraulic systems are cooled down prior to performing work on system components.

Hydraulic – Assure system hoses are bled off prior to performing work on system component

Gravity – Load lifting devices must be relieved of suspended load and load must be secured from movement.

PRELIMINARY FIELD SERVICE REPORT

Location

HALLIBURTON - Carmichaels
1614 E. ROY E. FURMAN HWY
CARMICHAELS PA 15320

FSR Number: 27846
Maint Order #: 311598831
Start Time: 5/21/2014 7:26 PM

PM: B Unit Code: CleanUp PM:

2007 Cat Blender (S93)

Unit #: 11124263

VIN #: 1M91H40207A211450

Tag #: 2654JJ

Mileage:

Engine Hours 7661.00

CREW: Zach Zielinski, Pablo Vela, Michael Polk

1. Primary driveline slip yoke missing zinc
2. Femco cap is missing

SERVICES PROVIDED

Auxiliary component inspection

Brake inspect/adjust

Engine oil D&F

Qty 73 CHEVRON ~ CHEV15/40H

Replace air filters

Qty: 2 FLEETGUARD ~ AF4609

Qty: 2 FLEETGUARD ~ AF4874

Replace fuel filters

Qty 1 CAT : 326-1643

Qty 1 CAT ~ 1R0755

Replace hydraulic filters

Qty 4 FLEETGUARD ~ HF35000

Replace oil filters

Qty 2 CAT ~ 2752604

Torque lugs

FLUID LEVEL CHECKS/TOPOFFS

Fluid	Initial Level	Qty	Description
Centrifugal Fluid (DS)	FULL		
Centrifugal Fluid (PS)	FULL		
Engine Oil	FULL		
Gear/Drop Box DS/F	FULL		
Gear/Drop Box PS/R	FULL		
Hydraulic Fluid (TopOff)	LOW	14.00	CHEVRON HD 389 HAL
Radiator Coolant DS/F	FULL		
Zircs	DONE	58.00	

NOTES

Crew #10

Could not service gearbox due to hoses in front of drain plug

Could not inspect/grease brakes due to fluid and hoses under unit

HESI00274

ENGINE RUN-UPS

Engine 1 Run-Up

Engine Idle	RPM	700	PSI	48
Engine With	1000	RPM	PSI	52
Engine Max Run-Up	RPM	2200	PSI	63

Engine 2 Run-Up

Engine Idle	RPM		PSI	
Engine With	1000	RPM	PSI	52
Engine Max Run-Up	RPM		PSI	

TIRES/BRAKES

PSI:

	105	100	
	100	105	
	105	105	
	105	110	

BRAKE LINING:

TREAD 32nd:

	20	18	
	17	21	
	18	11	
	18	12	

SLACK TRAVEL:

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S938

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11124263	7818 hrs	Homer City	5-31-14
MO# 311659511		V = OK F = Fail (Create RPM order) N/A = not applicable	
Where was PM performed?		Vendor	Shop <input type="checkbox"/> Field <input checked="" type="checkbox"/>
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature <i>[Signature]</i>			
Employee Name and Number:			Date:
Employee Name and Number:			Date:
Employee Name and Number:			Date:
SAFETY			
1	Read and understand all applicable procedures		
2	Conduct safety huddle prior to work to identify safety hazards		<input checked="" type="checkbox"/>
3	Wear appropriate PPE before beginning work.		<input checked="" type="checkbox"/>
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		<input checked="" type="checkbox"/>
5	Check for current inspection date on fire extinguisher Replace fire extinguisher if not current		<input checked="" type="checkbox"/>
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks and/or damage or missing parts		<input checked="" type="checkbox"/>
7	Check proper operation of air restriction gauge		<input checked="" type="checkbox"/>
8	Replace air filters		<input checked="" type="checkbox"/>
9	Inspect to insure air intake covers are in place		<input checked="" type="checkbox"/>
10	Test emergency shutdown devices if equipped. A. With engine water temperature at least 100°F and engine operating at 1000 RPM, activate emergency kill switch Engine should stop and rig savers should close Diagnose and repair savers if they fail to operate properly For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test Activate the engine over speed function in the CAT ET Slowly increase engine rpm until rig saver activates B. Ensure rig savers are properly latched in the open position after the test		NA
11	Check radiator, mounts, supports and guards		<input checked="" type="checkbox"/>
12	Check all hoses, lines and connections for leaks		<input checked="" type="checkbox"/>
13	Check radiator for obstruction and condition		<input checked="" type="checkbox"/>
14	Check coolant level and protection to minus 34°F (-37°C)		<input checked="" type="checkbox"/>
15	Check fan hub and fan assembly for proper operation and condition		<input checked="" type="checkbox"/>
16	Check engine cooling system for contamination		<input checked="" type="checkbox"/>
17	Check belt condition and adjust if needed		<input checked="" type="checkbox"/>
18	Pressure test cooling system and cap		<input checked="" type="checkbox"/>
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)		NA
20	Change engine oil and filter		<input checked="" type="checkbox"/>
21	Collect engine oil samples and submit for analysis		NA
22	Check engine lubrication system for leaks or damage		<input checked="" type="checkbox"/>
23	Check condition of hot oil hoses		<input checked="" type="checkbox"/>

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Dewese

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Preventive Maintenance Check Sheet

Revision Date 3/27/2014

HESI00276

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks		✓
25	Check fuel tank mounting and condition		✓
26	Check condition of fuel lines		✓
27	Change fuel filters		✓
28	Check fuel cap and vents		F
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full		W/A
30	Check exhaust system for leaks or damage		✓
31	Check for exhaust system missing parts, loose mounts		✓
32	Check rain cap for proper mounting and operation		✓
33	Check for cracks in muffler flange or mounting		✓
34	Replace open crankcase ventilation filter SAP part # 101597134. Torque cap to 220 in/lbs		W/A
35	Clean CRS head. SAP part # 101597135		
36	Inspect spark plug for carbon build up on CRS head. Replace with SAP part # 101597157 if		
37	Replace any manifold that is cracked		
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed		✓
39	Check cables and wiring for routing and condition		✓
40	Check battery box and cover condition and mounting		✓
41	Check alternator and wiring condition		✓
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> . Create a separate MO to document and use assembly code PEQ-13-008.		
43	Check voltage of alternator output and replace if needed		✓
44	Repair any light not working properly. Check condition of reflectors and reflective tape		✓
45	Check wiring for condition, properly routed and secured		✓
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>		✓
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks		✓
48	Check volume tank condition and drain condensate		✓
49	Verify operation of safety valve		✓
50	Check operation and condition of sand screw vibrators		✓
HYDRAULIC SYSTEMS		LH/FT	RH
51	Check for leaks and oil level		F
52	Check condition of hoses and routing		✓
53	Check hydraulic pumps for leaks and mounting		✓
54	Check hydraulic motors for leaks and mounting		✓
55	Check hydraulic control valves for leaks and mounting		✓
56	Check oil cooler for leaks and condition		✓
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required		✓
58	Check automatic tub level valve for operation		✓
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting		✓
60	Check turbine agitator		✓
61	Check for leaks		✓
62	Check condition of tub screen and bolts		✓
63	Ensure that all suction and discharge manifold outlets have tethered caps installed.		✓
64	Check condition of tub screen and bolts. Refer to bulletin. <u>SEQ-00-011</u>		✓

Process Owner Global Equipment Maintenance Manager
Approver Larry Deweese

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Preventive Maintenance Check Sheet
Revision Date 3/27/2014

HESI00277

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			✓
66	Check hatch cover for operation and damage			✓
67	Check hatch latching devices for operation and damage			✓
68	Ensure sealing surface is clean and gasket is in good condition			✓
69	Check hatch vent for operation and damage			✓
70	Check turbine agitator			✓
71	Check shaft motor coupling			✓
72	Check for leaks			✓
GAUGE PANEL			LH/FT	RH
73	Check panel mounting and latch pins			✓
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			✓
75	Check for secure mounting of attached components			✓
76	Check stairway for operation			NA
77	Lubricate joints on stair way			✓
78	Check hydraulic cylinder for mounting and leaks			✓
79	Check fluid level in reservoir			✓
80	Check switch connections and mounting			✓
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			✓
82	Check cab mounts and condition			✓
83	Check doors, latches and windows			✓
84	Check mounting and condition of instrument panels and cabinets			✓
85	Check for broken switches and gauges			✓
86	Check condition of electrical components			✓
87	Check control stand for secure mounting			✓
88	Check hydraulic controls for leaks and operation			✓
SANDSCREWS				CH
89	Check mounting supports and safety latch			✓
90	Check sand screw mounting bolts on FB4K for tightness and wear.			✓
91	Check for proper operation.			✓
92	Check for damage or wear			✓
93	Lubricate all rollers and safety latch			✓
94	Check valves and hoses on injection system			✓
95	Check mounting of motors.			✓
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw.			✓
97	Check gear box oil level and condition.			✓
98	Ensure Hopper Grate is in good condition and bolted in place			✓
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts			✓
100	Check mounting of micro motion meters and controllers if applicable.			✓
101	Check mounting of pumps, hoses, and encoders or counters			✓
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate.		✓	✓
103	Check mounts for cracks, wear or missing parts.		✓	✓
104	Check for leaks and loose parts		✓	✓

Process Owner Global Equipment Maintenance Manager
 Approver: Larry Dewese

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Preventive Maintenance Check Sheet
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HESI00278

HALLIBURTON

HRB/Slurry/EB4K/GEL PRO Trailer

CL-GL-HAL-1EM-PREV-S93B

U-JOINTS AND DRIVE LINES		CH
105	Check U-joints and drive shafts for loose parts or damage	✓
106	Lubricate drive line and u-joints	✓
107	Check guard condition and verify proper and secure mounting	✓
GEAR BOX		LH/FT RH
108	Check mounts	✓
109	Check oil level and for contamination. Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	✓
110	Inspect vents.	✓
111	Check gear box for leaks.	✓
CLUTCH AND LINKAGE		LH/FT RH
112	Check clutch and adjust if needed	✓
113	Check linkage for loose or missing parts	✓
114	Lubricate bearing and linkage	✓
CRANE		SUC DIS
115	Check mounting	NA
116	Check electrical connection	✓
117	Check pinning devices	✓
118	Check for proper operation	✓
119	Check electrical cables and connections	✓
120	Check cable and hook	✓
121	Check for required decals	✓
SACK ELEVATOR		CH
122	Check for proper operation	NA
123	Check mounting for damage or loose bolts	✓
124	Check chain adjustment	✓
125	Check rollers and slides	✓
CHASSIS COUPLING DEVICES AND LANDING GEAR		CH
126	Check for proper operation	✓
127	Check for damage and wear	✓
128	Check king pin with gauge	NA
129	Lubricate as required	✓
BLOWER		CH
130	Verify blower is mounted properly and fasteners are secure	✓
131	Check drive coupling for condition and lubrication	✓
132	Lubricate blower box at fittings	✓
133	Check oil level in blower box reservoir	✓
134	Check controls for mounting and operating labels	✓
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	rpm
136	Check air filter, plumbing, and filter housing	✓
137	Check discharge piping and verify valve operation	✓
GENERATOR		CH
138	Check generator for proper operation	✓
139	Check output voltage (120) and hertz (60)	✓
140	Check 110vac lighting system	✓
141	Check for secure mounting	✓
142	Check hydraulic motor coupling	✓
143	Check cables and connections	✓

Process Owner: Global Equipment Maintenance Manager
Approver: Larry Dewese

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Preventive Maintenance Check Sheet
Revision Date: 3/27/2014

HESI00279

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-JEM-PREV-S93B

IRON AND HOSE RACKS						CH	
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc are held securely in place					✓	
145	Check for secure mounting of racks and all storage devices					✓	
FRAME AND SUSPENSION						CH	
146	Check all mounts for missing bolts and damage					✓	
147	Check frame for cracks and damage					✓	
148	Check safety guards for secure mounting and placement					✓	
149	Check suspension components					✓	
150	Check bumpers and fenders for mounting and damage					✓	
151	Lubricate chassis and components					✓	
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets.					F	
BRAKES						CH	
153	Check all brake components					✓	
154	Check brake lining condition & thickness 1/4" min (6.35mm)					✓	
155	Check brake hoses for certified markings and conditions					✓	
156	Ensure all hoses from valves to spring brakes are wrapped with protective material					✓	
157	Check condition of glad hands					✓	
158	Check brake hoses for routing and supports every 15 inches					✓	
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)					✓	
160	Check brake adjustments using travel method and record measurement					✓	
⇐ Front of Trailer		RF		RM		RR	
		LF		LM		LR	
TIRES AND WHEELS						CH	
161	Inspect wheel hubs and seals, check oil level					✓	
162	Check wheel bearings for excessive play. (Wheel must be off the ground with brakes released)					✓	
163	Check tires per regulatory requirements					✓	
164	Torque all wheels to manufacturers specifications					✓	
	Double Cap Nut Disc Wheel (inner and outer)				450-500 ft-lb		
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)				450-500 ft-lb	✓	
165	Check wheels, rims and mounting					✓	
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")					✓	
⇐ Front of Trailer			Pressure	Tread Depth		Pressure	Tread Depth
		RMO	100	13	RRO	100	15
		RMI	100	9	RRi	100	16
		LMI	100	20	LRI	100	22
		LMO	100	21	LRO	100	22

Process Owner Global Equipment Maintenance Manager
Approver Larry Dewese Page 5 of 7

Preventive Maintenance Check Sheet
Revision Date 3/27/2014

HESI00280

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

ENGINE RUN UP (Indicate units of measure)								CH
167	Check all gauges for functionality and clarity							
168	Record voltmeter			Meter 1		Meter 2	248	Volt
169	Record engine oil pressure at 1000 rpm			LH/FRT		RH		psi/bar
170	Record air pressure that compressor unloads							psi/bar
171	Record sand screw maximum RPM							rpm
172	Record hydraulic psi:	LH/FRT	RH		Record hydraulic psi:	LH/FRT	RH	psi/bar
	Parallel Charge		12	psi/bar	Suction Centrifugal			psi/bar
	Parallel LA #1		200	psi/bar	Agitator		200	psi/bar
	Parallel LA #2		200	psi/bar	Discharge Centrifugal			psi/bar
	Common Charge			psi/bar	Discharge Cent Charge			psi/bar
	Engine Fan		1000	psi/bar	Case Drain		0	psi/bar
	SS#1		200	psi/bar	Return		0	psi/bar
	SS#2		500	psi/bar	Loop		0	psi/bar
173	Record Hydraulic oil temperature							°F
174	Ensure no oil leaks and recheck oil to verify proper level							✓
ENVIRONMENTAL								CH
175	Dispose of all waste properly. Ensure all spills are cleaned up and properly contained							✓
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							✓
177	Verify that proper company logos and decals are installed as per the Branding initiative. Verify that the SAP equipment number is clearly marked on the unit (see the ESG Branding web page for guidelines)							✓
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable) Replace sticker if within 90 days of expiration date.					12/2013	Date
	b	Was a new DOT/CVIP sticker applied? (Circle response)					Yes	No
	c	Signature: <i>[Signature]</i>						Date
179	Install new sticker to indicate when the next PM is due							
180	Record date when next PM is due							Date
181	Record hours/miles/km when next PM is due.							Hour/Miles/KM

Process Owner Global Equipment Maintenance Manager
 Approver Larry Dewese Page 8 of 7

Preventive Maintenance Check Sheet
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HESI00281

HALLIBURTON

HRB/Slurry/EB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

1	Passenger side fuel tank cap does not secure properly		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
2	No reflective tape on mud flaps		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
3	Driver side fluid build up on motor & connected to gear box		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
4	Fluid build up on hoses connect to hydraulic tank		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
5	Fluid build up around hoses under engine		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
6	Due to unit being rigged up ready to fire did not perform DOT Brake test.		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
7	Due to unit being rigged up ready to fire did not perform E-Kill		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
8	Due to unit being in fluid and chemicals did not grease or inspect brakes		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
9	Fire crew waiting for unit to fire did not drain gear box informed on site mechanic		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	
10	Reflective tape peeling off Driver side rear fender		
	Mechanic name	Approval acquired	
	Repair date	Maintenance order #	

Report any errors found on check sheet to supervisor

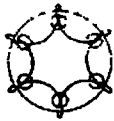
11. Front fan drive line front U-joint could not grease

Process Owner: Global Equipment Maintenance Manager
Approver: Larry Deweese

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Preventive Maintenance Check Sheet
Revision Date: 3/27/2014

HESI00282



SHARPOILFIELD

SERVICES

FIELD SERVICE REPORT

DATE 5-31-14

UNIT # 11124263 MODEL CAT LOCATION Homer City CUSTOMER HAL
 W.O. # 311659511 LEAD PP CREW RA CR
 VEHICLE DESCRIPTION Blender FRAC CREW NAME Crew 10 LUBE BAY ☐ FIELD ☒

SERVICE CODE: 593B 1DS HR: 7818 1PS HR: _____ 1AUX HR: _____ HUB HOURS: _____ ODOMETER: _____

FLUID TYPE	QTY ADDED	LOCATION
ELC 50/50		RADIATOR
M634 or TEGRA 460		POWER END
75W/90		GEAR BOX RIGHT ANGLE DIFFS CENTRIFUGALS HUBS
HD389		HYDRAULIC TANK TRANSMISSION
50 WT		TRANSMISSION
15 W/40		ENGINE TRANSMISSION
DEF		

SAFETY	SERVICE	PART #	QTY	SAFETY	SERVICE	PART #	QTY
	ENGINE DS	<u>15140</u>	<u>7548</u>		GREASE ZIRCS		<u>60</u>
	OIL FILTER				BRAKE INSPECTION/ ADJUST		
	ENGINE PS				AXLE HUB SERVICE		
	OIL FILTER	<u>LF3566</u>	<u>2</u>		AXLE HUB GASKET		
	FUEL FILTERS	<u>1R-D755</u>	<u>1</u>		DECK ENGINE		
	FWS	<u>326-1643</u>	<u>1</u>		DECK ENGINE OIL FILTER		
	AIR FILTER	<u>AF4609</u>	<u>2</u>		DECK ENGINE FUEL FILTER		
	-INNER	<u>AF4874</u>	<u>2</u>		DECK ENGINE FWS		
	OIL SAMPLE				DECK ENGINE AIR FILTER		
	HYDRAULIC FILTER	<u>P174914</u>	<u>4</u>		GEAR BOX D&F		
	HYDRAULIC FLUID SERVICES				GEAR BOX D&F		
	TRANSMISSION FILTER				GEAR BOX D&F		
	HIGH PRESSURE TRANS FILTER						
	TRANSMISSION D&F						
	TRANSMISSION D&F 2						
	COOLANT FILTER						
	POWER END FILTERS						
	POWER END D&F1						
	POWER END D&F2						
	AIR DRYER						
	DIFFERENTIAL FILTER						
	DIFFERENTIAL D&F #1						
	DIFFERENTIAL D&F #2						
	POWER STEERING SERVICE						
	POWER STEERING FILTER						
	SPARK PLUG						
	CRANKCASE FILTER						

COMMENTS:

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

12

Equipment #	Record PM Meter reading (Verify meter functions properly)	Shop location	DATE
11124263	7661 hrs	Stat Oil Dangel Pad, OH	5-21-14
MO# 311598831		V = OK F = Fail (Create RPM order) N/A = not applicable	
Where was PM performed? Wellsite - OH		Vendor	Shop
Check SAP maintenance order history for component replacement/recent repairs as required			
Halliburton Energy Services certifies that this vehicle has passed an inspection in accordance with 49 CFR 396.17 (USA only) Mechanic signature.			
Employee Name and Number: Fleetserve - Zach Zielinski		Date: 5-21-14	
Employee Name and Number:		Date:	
Employee Name and Number:		Date:	
SAFETY			
1	Lock out/tag out unit as per HMS procedures		✓
2	Conduct safety huddle prior to work to identify safety hazards		✓
3	Wear appropriate PPE before beginning work.		✓
SAFETY EQUIPMENT			CH
4	Check fire extinguisher mounting bracket and latch assembly		✓
5	Check for current inspection date on fire extinguisher Replace fire extinguisher if not current		✓
ENGINE INSPECTION			LH/FT RH
6	Check air intake system hoses, piping, housings and connections for leaks, and/or damage or missing parts	✓	N/A
7	Check proper operation of air restriction gauge	✓	
8	Replace air filters	✓	
9	Inspect to insure air intake covers are in place	✓	
10	Test emergency shutdown devices if equipped. A With engine water temperature at least 100°F, and engine operating at 1000 RPM, activate emergency kill switch Engine should stop and ng savers should close Diagnose and repair savers if they fail to operate properly For ECM controlled CAT engines use the CAT ET diagnostic software to perform the following test Activate the engine over speed function in the CAT ET Slowly increase engine rpm until ng saver activates B Ensure ng savers are properly latched in the open position after the test.	N/A	
11	Check radiator, mounts, supports and guards	✓	
12	Check all hoses, lines and connections for leaks	✓	
13	Check radiator for obstruction and condition	✓	
14	Check coolant level and protection to minus 34°F (-37°C)	- 45	
15	Check fan hub and fan assembly for proper operation and condition	✓	
16	Check engine cooling system for contamination	✓	
17	Check belt condition and adjust if needed	✓	
18	Pressure test cooling system and cap	✓	
19	Check pH and SCA and adjust as necessary (Non ELC coolant only)	✓	
20	Change engine oil and filter	✓	
21	Collect engine oil samples and submit for analysis	N/A	
22	Check engine lubrication system for leaks or damage	✓	
23	Check condition of hot oil hoses	✓	✓

Process Owner: Global Equipment Maintenance Manager
Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00284

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-ITEM-PREV-S93B

ENGINE INSPECTION (cont)		LH/FT	RH
24	Check fuel system for leaks	✓	✓
25	Check fuel tank mounting and condition	✓	✓
26	Check condition of fuel lines	✓	✓
27	Change fuel filters	✓	✓
28	Check fuel cap and vents	✓	✓
29	On units that require Diesel Exhaust Fluid (DEF), ensure the DEF tank is full	N/A	✓
30	Check exhaust system for leaks or damage	✓	✓
31	Check for exhaust system missing parts, loose mounts	✓	✓
32	Check rain cap for proper mounting and operation	✓	✓
33	Check for cracks in muffler flange or mounting	✓	✓
34	Replace open crankcase ventilation filter SAP part # 101597134 Torque cap to 220 in/lbs	N/A	✓
35	Clean CRS head SAP part # 101597135	✓	✓
36	Inspect spark plug for carbon build up on CRS head Replace with SAP part # 101597157 if	✓	✓
37	Replace any manifold that is cracked	✓	✓
ELECTRICAL SYSTEM			CH
38	Check batteries condition-clean as needed	✓	✓
39	Check cables and wiring for routing and condition	✓	✓
40	Check battery box and cover condition and mounting	✓	✓
41	Check alternator and wiring condition	✓	✓
42	On FB4K units with the "dual-ganged" Leece-Neville alternator system, upgrade the charging system as per tech bulletin <u>PEQ-13-008-A</u> . Create a separate MO to document and use assembly code PEQ-13-008		OP
43	Check voltage of alternator output and replace if needed	✓	✓
44	Repair any light not working properly. Check condition of reflectors and reflective tape	✓	✓
45	Check wiring for condition, properly routed and secured	✓	✓
46	Ensure a lockable master power disconnect switch for LOTO has been installed in the battery box as per <u>Mechanic's Toolbox portal issue 48709</u>	✓	✓
AUXILIARY AIR SYSTEM			CH
47	Check air system for leaks	✓	✓
48	Check volume tank condition and drain condensate	✓	✓
49	Verify operation of safety valve	✓	✓
50	Check operation and condition of sand screw vibrators	✓	✓
HYDRAULIC SYSTEMS			CH
51	Check for leaks and oil level	✓	✓
52	Check condition of hoses and routing	✓	✓
53	Check hydraulic pumps for leaks and mounting	✓	✓
54	Check hydraulic motors for leaks and mounting	✓	✓
55	Check hydraulic control valves for leaks and mounting	✓	✓
56	Check oil cooler for leaks and condition	✓	✓
57	Change all hydraulic filters including high pressure and case drain filters on all units equipped with electro-hyd controlled systems as required	✓	✓
58	Check automatic tub level valve for operation	✓	✓
BLENDING TUB AND MANIFOLD			CH
59	Check tub mounting	✓	✓
60	Check turbine agitator	✓	✓
61	Check for leaks	✓	✓
62	Check condition of tub screen and bolts.	✓	✓
63	Ensure that all suction and discharge manifold outlets have tethered caps installed	✓	✓
64	Check condition of tub screen and bolts Refer to bulletin: <u>SEQ-00-011</u>	✓	✓

Process Owner: Global Equipment Maintenance Manager

Approver: Larry Deweese

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Preventive Maintenance Check Sheet

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HESI00285

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-LEM-PREV-S93B

GEL STORAGE/HYDRATION TANK				CH
65	Check mounting			✓
66	Check hatch cover for operation and damage			✓
67	Check hatch latching devices for operation and damage			✓
68	Ensure sealing surface is clean and gasket is in good condition			✓
69	Check hatch vent for operation and damage			✓
70	Check turbine agitator			✓
71	Check shaft motor coupling			✓
72	Check for leaks			✓
GAUGE PANEL			LH/FT	RH
73	Check panel mounting and latch pins		✓	N/A
WALKWAY AND SUPPORTS				CH
74	Check all mounting for cracks and damage			✓
75	Check for secure mounting of attached components			✓
76	Check stairway for operation			✓
77	Lubricate joints on stair way			✓
78	Check hydraulic cylinder for mounting and leaks			✓
79	Check fluid level in reservoir			✓
80	Check switch connections and mounting			✓
CONTROL HOUSE/STANDS				CH
81	Check operation of throttles			✓
82	Check cab mounts and condition			✓
83	Check doors, latches and windows			✓
84	Check mounting and condition of instrument panels and cabinets			✓
85	Check for broken switches and gauges			✓
86	Check condition of electrical components			✓
87	Check control stand for secure mounting			✓
88	Check hydraulic controls for leaks and operation			✓
SANDSCREWS				CH
89	Check mounting supports and safety latch.			✓
90	Check sand screw mounting bolts on FB4K for tightness and wear.			✓
91	Check for proper operation			✓
92	Check for damage or wear.			✓
93	Lubricate all rollers and safety latch.			✓
94	Check valves and hoses on injection system			✓
95	Check mounting of motors			✓
DRY ADDITIVE SYSTEM				CH
96	Check condition of feeder and screw			✓
97	Check gear box oil level and condition.			✓
98	Ensure Hopper Grate is in good condition and bolted in place			✓
CHEMICAL TRANSFER/LIQUID ADDITIVE SYSTEM				CH
99	Check condition of tanks, connection, hose and mounts			✓
100	Check mounting of micro motion meters and controllers if applicable			✓
101	Check mounting of pumps, hoses, and encoders or counters			✓
CENTRIFUGAL PUMPS		REC	SUC	DIS
102	Check oil level in pumps and lubricate	✓	✓	✓
103	Check mounts for cracks, wear or missing parts.	✓	✓	✓
104	Check for leaks and loose parts	✓	✓	✓

Process Owner Global Equipment Maintenance Manager
 Approver: Larry Deweese

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Preventive Maintenance Check Sheet
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HESI00286

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-DEM-PREV-S93B

U-JOINTS AND DRIVE LINES			CH
105	Check U-joints and drive shafts for loose parts or damage		✓
106	Lubricate drive line and u-joints		F
107	Check guard condition and verify proper and secure mounting		✓
GEAR BOX			
		LH/FT	RH
108	Check mounts	✓	✓
109	Check oil level and for contamination. Proper gear box oil is Chevron Delo Syngear 75W90 SAP 101434286	✓	✓
110	Inspect vents	✓	✓
111	Check gear box for leaks	✓	✓
CLUTCH AND LINKAGE			
		LH/FT	RH
112	Check clutch and adjust if needed	N/A	N/A
113	Check linkage for loose or missing parts	↓	↓
114	Lubricate bearing and linkage	↓	↓
CRANE			
		SUC	DIS
115	Check mounting	N/A	N/A
116	Check electrical connection	↓	↓
117	Check pinning devices	↓	↓
118	Check for proper operation	↓	↓
119	Check electrical cables and connections	↓	↓
120	Check cable and hook	↓	↓
121	Check for required decals	↓	↓
SACK ELEVATOR			CH
122	Check for proper operation		N/A
123	Check mounting for damage or loose bolts		↓
124	Check chain adjustment		↓
125	Check rollers and slides		↓
CHASSIS COUPLING DEVICES AND LANDING GEAR			CH
126	Check for proper operation		✓
127	Check for damage and wear		✓
128	Check king pin with gauge		N/A
129	Lubricate as required		✓
BLOWER			CH
130	Verify blower is mounted properly and fasteners are secure		✓
131	Check drive coupling for condition and lubrication		✓
132	Lubricate blower box at fittings		✓
133	Check oil level in blower box reservoir		✓
134	Check controls for mounting and operating labels		✓
135	Check operation of blower. Record max blower rpm (not to exceed 1800 rpm)	OP	rpm
136	Check air filter, plumbing, and filter housing		✓
137	Check discharge piping and verify valve operation		✓
GENERATOR			CH
138	Check generator for proper operation		✓
139	Check output voltage (120) and hertz (60)		✓
140	Check 110vac lighting system		✓
141	Check for secure mounting		✓
142	Check hydraulic motor coupling		✓
143	Check cables and connections		✓

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

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HESI00287

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

IRON AND HOSE RACKS						CH	
144	Check all iron and hose securing devices. Assure all hoses, fittings, valves, etc are held securely in place					✓	
145	Check for secure mounting of racks and all storage devices					✓	
FRAME AND SUSPENSION						CH	
146	Check all mounts for missing bolts and damage					✓	
147	Check frame for cracks and damage					✓	
148	Check safety guards for secure mounting and placement					✓	
149	Check suspension components					✓	
150	Check bumpers and fenders for mounting and damage					✓	
151	Lubricate chassis and components					✓	
152	Check mounting and condition of mud flaps. Ensure reflective tape assembly is attached to mud flap brackets						
BRAKES						CH	
153	Check all brake components					—	
154	Check brake lining condition & thickness 1/4" min (6.35mm)					—	
155	Check brake hoses for certified markings and conditions					—	
156	Ensure all hoses from valves to spring brakes are wrapped with protective material					—	
157	Check condition of glad hands					✓	
158	Check brake hoses for routing and supports every 15 inches					—	
159	Perform DOT brake function test (Tractor Protection Valve Test) or (Simulate with Shop Air by removing the shop air quickly from the Red (supply) Glad Hand and identifying the proper operation of the systems control valves)					✓	
160	Check brake adjustments using travel method and record measurement					—	
⇐ Front of Trailer		RF	—	RM	N/A	RR	—
		LF	—	LM	✓	LR	—
TIRES AND WHEELS						CH	
161	Inspect wheel hubs and seals, check oil level					✓	
162	Check wheel bearings for excessive play. (Wheel must be off the ground with brakes released)					N/A	
163	Check tires per regulatory requirements					✓	
164	Torque all wheels to manufacturers specifications					✓	
	Double Cap Nut Disc Wheel (inner and outer)				450-500 ft-lb	N/A	
	Hub Piloted Wheel Mounting (Single Flanged Cap Nut)				450-500 ft-lb	✓	
165	Check wheels, rims and mounting					✓	
166	Ensure tire pressure is at recommended pressure and record pressure and tread depth (min 2/32")					✓	
⇐ Front of Trailer			Pressure	Tread Depth		Pressure	Tread Depth
		RMO	105	20	RRO	100	18
		RMI	100	17	RRI	105	21
		LMI	105	18	LRI	105	11
		LMO	105	18	LRO	110	12

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Dewese

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HESI00288

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-1EM-PREV-S93B

ENGINE RUN UP (indicate units of measure)								CH
167	Check all gauges for functionality and clarity							✓
168	Record voltmeter	Meter 1	21.3	Meter 2	N/A	Volt		
169	Record engine oil pressure at 1000 rpm	LH/FRT	5.2	RH		psi/bar		
170	Record air pressure that compressor unloads							CP
171	Record sand screw maximum RPM							OP
172	Record hydraulic psi.	LH/FRT	RH		Record hydraulic psi	LH/FRT	RH	psi/bar
	Parallel Charge	12	N/A		Suction Centrifugal	N/A	N/A	psi/bar
	Parallel LA #1	200			Agitator			psi/bar
	Parallel LA #2	200			Discharge Centrifugal			psi/bar
	Common Charge	N/A			Discharge Cent Charge	✓		psi/bar
	Engine Fan	1000			Case Drain	○		psi/bar
	SS#1	200			Return	○		psi/bar
	SS#2	100	✓		Loop	○	✓	psi/bar
173	Record Hydraulic oil temperature							70
174	Ensure no oil leaks and recheck oil to verify proper level							✓
ENVIRONMENTAL								CH
175	Dispose of all waste properly Ensure all spills are cleaned up and properly contained							✓
REQUIRED PAPER WORK								
176	Check regulatory documents and decals per State and/or Country Requirements (DOT, CVIP, MMS Coast Guard, etc)							✓
177	Verify that proper company logos and decals are installed as per the Branding initiative Verify that the SAP equipment number is clearly marked on the unit (see the <u>ESG Branding web page</u> for guidelines)							✓
178	a	Record date of DOT/CVIP and/or state annual inspection sticker (if applicable). Replace sticker if within 90 days of expiration date.				10/13	Date	
	b	Was a new DOT/CVIP sticker applied? (Circle response)					Yes	(No)
	c	Signature:					Date	
179	Install new sticker to indicate when the next PM is due							✓
180	Record date when next PM is due.					6-21-14	Date	
181	Record hours/miles/km when next PM is due					7961 hrs	Hour/Miles/KM	

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Deweese

Page 6 of 7

Preventive Maintenance Check Sheet
 Revision Date: 5/1/2014

HESI00289

HALLIBURTON

HRB/Slurry/FB4K/GEL PRO Trailer

CL-GL-HAL-IEM-PREV-S93B

LIST ALL REPAIRS THAT WERE FOUND DURING THE INSPECTION. THIS LIST WILL BE USED AS A TOOL TO RESCHEDULE ANY REPAIRS THAT WERE FOUND DURING PM INSPECTION.

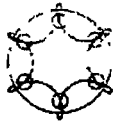
1	<i>Primary diaphragm air gate missing wire</i>		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
2	<i>Feeder cap is missing</i>		
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
3			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
4			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
5			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
6			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
7			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
8			
	Mechanic name:		Approval acquired:
	Repair date		Maintenance order #
9			
	Mechanic name		Approval acquired
	Repair date		Maintenance order #
10			
	Mechanic name		Approval acquired
	Repair date:		Maintenance order #:
Report any errors found on check sheet to supervisor			

Process Owner: Global Equipment Maintenance Manager
 Approver: Larry Dewese

Page 7 of 7

Preventive Maintenance Check Sheet
 Revision Date: 5/1/2014

HESI00290



SHARPOILFIELD SERVICES

FIELD SERVICE REPORT

DATE 6/14/14

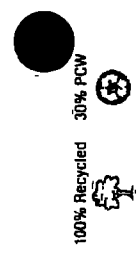
UNIT # <u>11124263</u>	MODEL _____	LOCATION <u>Homer City PA</u>	CUSTOMER <u>H&I</u>
W.O. # <u>311709452</u>	LEAD <u>WM</u>	CREW <u>CSR ML</u>	TRAINING _____
VEHICLE DESCRIPTION <u>FB4K</u>	FRAC CREW NAME <u>Crew 10</u>	LUBE BAY <input type="checkbox"/>	FIELD <input type="checkbox"/>

SERVICE CODE: <u>593 B</u>	1DS HR: <u>8091</u>	1PS HR _____	1AUX HR: _____	HUB HOURS: _____	ODOMETER: _____
----------------------------	---------------------	--------------	----------------	------------------	-----------------

FLUID TYPE	QTY ADDED	LOCATION
ELC 50/50		RADIATOR
M634 or TEGRA 460		POWER END
75W/90		GEAR BOX RIGHT ANGLE DIFFS CENTRIFUGALS HUBS
<u>HD389</u>	<u>13 qt</u>	<u>HYDRAULIC TANK</u> TRANSMISSION
50 WT		TRANSMISSION
15 W/40		ENGINE TRANSMISSION
DEF		

SAFETY	SERVICE	PART #	QTY	SAFETY	SERVICE	PART #	QTY
<u>WM</u>	ENGINE DS	<u>15/40</u>	<u>72</u>	<u>WM</u>	GREASE ZIRCS		<u>52</u>
	OIL FILTER			<u>WM</u>	BRAKE INSPECTION/ ADJUST		<u>2</u>
	ENGINE PS				AXLE HUB SERVICE		
<u>WM</u>	OIL FILTER	<u>LF3566</u>	<u>2</u>		AXLE HUB GASKET		
<u>WM</u>	FUEL FILTERS	<u>1R-0755</u>	<u>1</u>		DECK ENGINE		
<u>WM</u>	FWS	<u>326-1643</u>	<u>1</u>		DECK ENGINE OIL FILTER		
<u>WM</u>	AIR FILTER	<u>AF 4609</u>	<u>2</u>		DECK ENGINE FUEL FILTER		
<u>WM</u>	INNER	<u>AF 4874</u>	<u>2</u>		DECK ENGINE FWS		
	OIL SAMPLE				DECK ENGINE AIR FILTER		
<u>WM</u>	HYDRAULIC FLUID SERVICES	<u>7174914</u>	<u>4</u>	<u>WM</u>	GEAR BOX D&F	<u>75/90</u>	<u>7.4</u>
	TRANSMISSION FILTER				GEAR BOX D&F		
	HIGH PRESSURE TRANS FILTER				GEAR BOX D&F		
	TRANSMISSION D&F						
	TRANSMISSION D&F 2						
	COOLANT FILTER						
	POWER END FILTERS						
	POWER END D&F1						
	POWER END D&F2						
	AIR DRYER						
	DIFFERENTIAL FILTER						
	DIFFERENTIAL D&F #1						
	DIFFERENTIAL D&F #2						
	POWER STEERING SERVICE						
	POWER STEERING FILTER						
	SPARK PLUG						
	CRANKCASE FILTER						

COMMENTS:



Held Competencies

[Print](#) | [Export](#) | [Modify Table](#)

<input type="checkbox"/>	Expert	Competency Name	Source	Last Assessed Level	Actions
<input type="checkbox"/>		Assessment Quality	Job Type: PF05-ESG	2 - Level 2	Actions
<input type="checkbox"/>		Discharge Manifold Equipment-Field		4 - Level 4	Actions
<input type="checkbox"/>		Frac-Chemical Handling	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Complete Call Sheet	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Frac-Completes Post job paperwork	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Frac-Computer Skills	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Discharge Manifold Equipmen...	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Electronic Cables and Conne...	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Equipment-Pump	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-General Safety	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-High Pressure Pump Maintenance	Job Type: PF05-ESG	5 - Level 5	Actions
<input type="checkbox"/>		Frac-Job Calculations	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Mobilize materials and equi...	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Frac-Operates Zone II equipment		3 - Level 3	Actions
<input type="checkbox"/>		Frac-Post job activities	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Pre-job activities	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Frac-Pre-job location review	Job Type: PF05-ESG	5 - Level 5	Actions
<input type="checkbox"/>		Frac-Qualified Pump Operator	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Frac-Rig Down and Depart Location	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Frac-Rig Up-Rig Down	Job Type: PF05-ESG	4 - Level 4	Actions

Anthony Beck: Held Competencies

View By All Held Competencies ▾

1 2

Held Competencies

| [Print](#) | [Export](#) | [Modify Table](#)

<input type="checkbox"/>	Expert	Competency Name	Source	Last Assessed Level	Actions
<input type="checkbox"/>		Frac-Supervisor		3 - Level 3	Actions
<input type="checkbox"/>		Frac-Test critical systems		4 - Level 4	Actions
<input type="checkbox"/>		Frac-Verifies fit-for-purpose eq...	Job Type: PF05-ESG	4 - Level 4	Actions
<input type="checkbox"/>		Ideal Driver	Job Type: PF05-ESG	5 - Level 5	Actions
<input type="checkbox"/>		Job Proposal Review	Job Type: PF05-ESG	3 - Level 3	Actions
<input type="checkbox"/>		Lifting and Handling- Qualified ...	Job Type: PF05-ESG	4 - Level 4	Actions

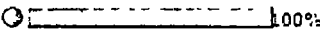

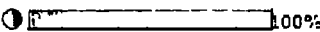
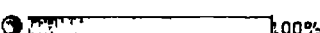
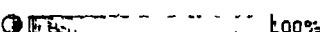
1 2

[Back](#)

Anthony Beck: Required Competencies

[Expand All](#) | [Collapse All](#) | [Add Required Competency](#) | [Modify Table](#)

	Competency Name	Required Level	Current Level	Score	Actions
Job : PF05-ESG-Svc Spec 1-Frac Acid					
Role : A Halliburton Employee					
<input type="checkbox"/>	Assessment Quality	1 - Level 1	2 - Level 2	0	Actions
<input type="checkbox"/>	Ideal Driver	1 - Level 1	5 - Level 5	0	Actions
Role : A Rater					
<input type="checkbox"/>	Assessment Quality	2 - Level 2	2 - Level 2	0	Actions
Role : Body Load Truck driver					
<input type="checkbox"/>	Ideal Driver	4 - Level 4	5 - Level 5	0	Actions
Role : Car Driver - office					
<input type="checkbox"/>	Ideal Driver	2 - Level 2	5 - Level 5	0	Actions
Role : Chemical Material Handler					
	Frac-Chemical Handling	4 - Level 4	4 - Level 4	0	Actions
Role : DME Handler					
<input type="checkbox"/>	Frac-Complete Call Sheet	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Frac-Computer Skills	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-Discharge Manifold Equipment-Field	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-Electronic Cables and Connections	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-General Safety	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-High Pressure Pump Maintenance	5 - Level 5	5 - Level 5	0	Actions
<input type="checkbox"/>	Frac-Job Calculations	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-Mobilize materials and equipment	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Frac-Post job activities	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-Pre-job activities	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Frac-Pre-job location review	4 - Level 4	5 - Level 5	0	Actions
<input type="checkbox"/>	Frac-Rig Down and Depart Location	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Frac-Rig Up-Rig Down	4 - Level 4	4 - Level 4	0	Actions

<input type="checkbox"/>		Frac-Pre-job location review	4 - Level 4	5 - Level 5	0	Actions
<input type="checkbox"/>		Frac-Rig Down and Depart Location	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>		Frac-Rig Up-Rig Down	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Test critical systems	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Verifies fit-for-purpose equipment	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Job Proposal Review	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Role : Fixed Load Articulated Tractor/Trailer driver					
<input type="checkbox"/>		Ideal Driver	5 - Level 5	5 - Level 5	0	Actions
<input type="checkbox"/>	Role : Iron Truck (line boss, ground operator)					
<input type="checkbox"/>		Frac-Discharge Manifold Equipment-Field	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Electronic Cables and Connections	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-General Safety	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-High Pressure Pump Maintenance	5 - Level 5	5 - Level 5	0	Actions
<input type="checkbox"/>		Frac-Job Calculations	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Mobilize materials and equipment	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>		Frac-Post job activities	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Pre-job activities	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Pre-job location review	4 - Level 4	5 - Level 5	0	Actions
<input type="checkbox"/>		Frac-Rig Down and Depart Location	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>		Frac-Rig Up-Rig Down	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Test critical systems	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-Verifies fit-for-purpose equipment	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>	Role : Logistics - Job Site					
<input type="checkbox"/>		Frac-Completes Post job paperwork	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Role : Pump Operator					
<input type="checkbox"/>		Frac-Equipment-Pump	4 - Level 4	4 - Level 4	0	Actions
<input type="checkbox"/>		Frac-High Pressure Pump Maintenance	5 - Level 5	5 - Level 5	0	Actions
<input type="checkbox"/>		Frac-Qualified Pump Operator	3 - Level 3	3 - Level 3	0	Actions
<input type="checkbox"/>	Role : Rigger					
<input type="checkbox"/>		Lifting and Handling- Qualified Rigger	4 - Level 4	4 - Level 4	0	Actions

G



80000 SERIES
30% P C W





80000 SERIES

30% P C W

11

	A	B	C	D	E
1	Chemicals on Location			7/2/2014	
2		Pre	Post		
3		Estimated	Estimated		
4	Chemical	Volume	Volume	Units	
5	HCl (28%) Residual	250	0	gal	
6	GasPerm 1000	7040	0	gal	
7	LCA-1	330	0	gal	
8	LGC-36 UC	1980	0	gal	
9	BC-140	1770	660	gal	
10	BE-9	3360	0	gal	
11	WG-36	38000	6000	lbs	Still smoldering
12	FR-66	4700	3650	gal	
13	Sand	5000	5000	sks	
14	Diesel (In Pumps)	8500	0	gal	
15	Pilot Tanker #1	700	0	gal	
16	Pilot Tanker #2	1100	1100	gal	
17	Oxygen	4	3	tanks	
18	Acetylene	3	2	tanks	
19	Propane	6	6	20 lb tanks	
20	Rock Drill	85	55	gal	
21	DEF	55	55	gal	
22	Hydraulic Fluid	85	55	gal	
23	Motor Oil	370	80	gal	
24	Aerosol Cans (assorted)	100	100	ea	
25	SP Breaker	1150	1150	lbs	
26	N2 Bottles	4	4	bottles	
27	Grease	30	30	gal	
28	Soda Ash	200	200	lbs	
29	Antifreeze	10	10	gal	
30	Used Oil	15	15	gal	
31	Densometers	3	3	ea	
32	ATF HD 389	55	55	gal	



1

MATERIAL SAFETY DATA SHEET**Product Trade Name: SAND - PREMIUM WHITE****Revision Date:** 05-Jan-2010**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION****Product Trade Name:** SAND - PREMIUM WHITE**Synonyms:** None**Chemical Family:** Sand**Application:** Proppant**Manufacturer/Supplier:** Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000**Prepared By:** Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com**2. COMPOSITION/INFORMATION ON INGREDIENTS**

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION**Hazard Overview****CAUTION! - ACUTE HEALTH HAZARD**
May cause eye and respiratory irritation**DANGER! - CHRONIC HEALTH HAZARD**
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES**Inhalation**

If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin	Wash with soap and water
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists
Ingestion	Under normal conditions, first aid procedures are not required
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media None - does not burn

Special Exposure Hazards Not applicable

Special Protective Equipment for Fire-Fighters Not applicable

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known

Procedure for Cleaning / Absorption Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Material is slippery when wet.

Storage Information Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection	Normal work gloves
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure
Other Precautions	None known

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.63 - 2.67
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	65

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known
Incompatibility (Materials to Avoid)	Hydrofluoric acid
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C)
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
------------------------------------	---------------------------------

Inhalation	<p>Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in expermental animals for the carcinogenicity of trndymite (IARC, Group 2A)</p> <p>Breathing silica dust may cause imtation of the nose, throat, and respiratory passages Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring Inhalation of dust may also have senous chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below)</p>
Skin Contact	None known
Eye Contact	May cause mechanical irritation to eye
Ingestion	None known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye imtation, should not be exposed to quartz dust
Chronic Effects/Carcinogenicity	<p>Silicosis Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function This disease is exacerbated by smoking Individuals with silicosis are predisposed to develop tuberculosis</p> <p>Cancer Status The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of trndymite (Group 2A - possible carcinogen to humans) Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997) in conjunction with the use of these minerals The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000) The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2)</p> <p>There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease</p>
Other Information	For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997)
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997)

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations

Contaminated Packaging Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

Material Safety Data Sheet

Airgas

Acetylene

Section 1. Chemical product and company identification

Product name : Acetylene
Supplier : AIRGAS INC , on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253
Product use : Synthetic/Analytical chemistry.
Synonym : acetylen, acetylene ; ethine, ethyne, narycylen
MSDS # : 001001
Date of Preparation/Revision : 5/11/2011.
In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas
Emergency overview : WARNING!
FLAMMABLE GAS.
MAY CAUSE FLASH FIRE
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA
CONTENTS UNDER PRESSURE.
Keep away from heat, sparks and flame. Do not puncture or incinerate container. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container closed
Contact with rapidly expanding gases can cause frostbite
Target organs : May cause damage to the following organs: lungs, upper respiratory tract, central nervous system (CNS)
Routes of entry : Inhalation
Potential acute health effects
Eyes : Contact with rapidly expanding gas may cause burns or frostbite
Skin : Contact with rapidly expanding gas may cause burns or frostbite
Inhalation : Acts as a simple asphyxiant.
Ingestion : Ingestion is not a normal route of exposure for gases
Potential chronic health effects
Chronic effects : May cause target organ damage, based on animal data.
Target organs : May cause damage to the following organs. lungs, upper respiratory tract, central nervous system (CNS)
Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Acetylene	74-86-2	100	NIOSH REL (United States, 6/2009). CEIL: 2662 mg/m ³ CEIL: 2500 ppm

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training if it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

- Flammability of the product** : Flammable
- Auto-ignition temperature** : 305°C (581°F)
- Flash point** : Closed cup -18 to 15°C (-0 to 7°F)
- Flammable limits** : Lower 2.5% Upper 100%
- Products of combustion** : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.
- Fire-fighting media and instructions** : In case of fire, use water spray (fog), foam or dry chemical.
- In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.
- Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage, do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

- Engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

Ethyne

NIOSH REL (United States, 6/2009).

CEIL 2662 mg/m³

CEIL 2500 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

- Molecular weight** : 26.04 g/mole
- Molecular formula** : C₂H₂
- Melting/freezing point** : Sublimation temperature: -81.8 °C (-115.2 to °F)
- Critical temperature** : 35.3 °C (95.5 °F)
- Vapor pressure** : 635 (psig)
- Vapor density** : 0.907 (Air = 1)
- Specific Volume (ft³/lb)** : 14.7058
- Gas Density (lb/ft³)** : 0.0691 (-80 °C / -112 to °F)

Acetylene

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable
- Incompatibility with various substances** : Extremely reactive or incompatible with the following materials oxidizing materials
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

- Chronic effects on humans** : May cause damage to the following organs lungs, upper respiratory tract, central nervous system (CNS)
- Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans

Specific effects

- Carcinogenic effects** : No known significant effects or critical hazards
- Mutagenic effects** : No known significant effects or critical hazards.
- Reproduction toxicity** : No known significant effects or critical hazards

Section 12. Ecological information

Aquatic ecotoxicity


Not available



- Products of degradation** : Products of degradation: carbon oxides (CO, CO₂) and water
- Environmental fate** : Not available
- Environmental hazards** : This product shows a low bioaccumulation potential
- Toxicity to the environment** : Not available

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1001	ACETYLENE, DISSOLVED	2 1	Not applicable (gas)		Limited quantity Yes Packaging instruction Passenger aircraft Quantity limitation: Forbidden Cargo aircraft Quantity limitation: 15 kg

Acetylene						
TDG Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		<u>Explosive Limit and Limited Quantity Index</u> 0 <u>Passenger Carrying Ship Index</u> 75 <u>Passenger Carrying Road or Rail Index</u> Forbidden <u>Special provisions</u> 38, 42
Mexico Classification	UN1001	ACETYLENE, DISSOLVED	2.1	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations

: TSCA 8(a) IUR: Partial exemption
United States inventory (TSCA 8b) This material is listed or exempted
SARA 302/304/311/312 extremely hazardous substances. No products were found
SARA 302/304 emergency planning and notification: No products were found
SARA 302/304/311/312 hazardous chemicals. Ethyne
SARA 311/312 MSDS distribution - chemical inventory - hazard identification
Ethyne Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard
Clean Air Act (CAA) 112 accidental release prevention - Flammable Substances:
Acetylene

State regulations

Clean Air Act (CAA) 112 regulated flammable substances: Ethyne
: **Connecticut Carcinogen Reporting:** This material is not listed
Connecticut Hazardous Material Survey This material is not listed
Florida substances This material is not listed
Illinois Chemical Safety Act This material is not listed
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed
Louisiana Spill: This material is not listed.
Massachusetts Spill This material is not listed.
Massachusetts Substances This material is listed.
Michigan Critical Material This material is not listed.
Minnesota Hazardous Substances This material is not listed
New Jersey Hazardous Substances: This material is listed
New Jersey Spill. This material is not listed.
New Jersey Toxic Catastrophe Prevention Act. This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting This material is not listed.
Pennsylvania RTK Hazardous Substances This material is listed.

Acetylene

Rhode Island Hazardous Substances: This material is not listed

Canada

WHMIS (Canada) : Class A Compressed gas
Class B-1: Flammable gas
Class F Dangerously reactive material
CEPA Toxic substances This material is not listed.
Canadian ARET This material is not listed
Canadian NPRI This material is listed
Alberta Designated Substances This material is not listed.
Ontario Designated Substances This material is not listed
Quebec Designated Substances This material is not listed

Section 16. Other information

United States

Label requirements : FLAMMABLE GAS
MAY CAUSE FLASH FIRE
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA
CONTENTS UNDER PRESSURE.

Canada

Label requirements : Class A Compressed gas
Class B-1 Flammable gas
Class F Dangerously reactive material.

Hazardous Material Information System (U.S.A.)

Health	*	1
Flammability		4
Physical hazards		2

National Fire Protection Association (U.S.A.)



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

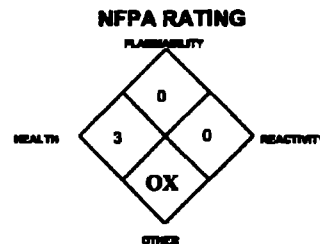
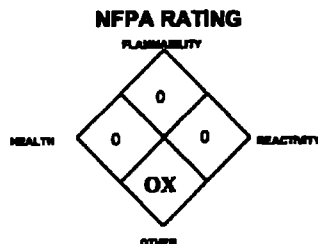
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



MATERIAL SAFETY DATA SHEET

OXYGEN GAS

OXYGEN REFRIGERATED LIQUID



Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I What is the material and what do I need to know in an emergency?

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:

OXYGEN O₂
OXYGEN O₂
REFRIGERATED LIQUID

Document Number: 001043

For general analytical/synthetic chemical uses.

PRODUCT USE:

SUPPLIER/MANUFACTURER'S NAME:

AIRGAS INC.

ADDRESS:

259 N. Radnor-Chester Road

Suite 100

Radnor, PA 19087-5283

BUSINESS PHONE:

1-610-687-5253

EMERGENCY PHONE:

CHEMTREC: 1-800-424-9300

International: 703-527-3887 (Call Collect)

DATE OF PREPARATION:

May 20, 1996

THIRD REVISION:

April 5, 2000

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
Oxygen	7782-44-7	99.0%	There are no specific exposure limits for Oxygen. Oxygen levels should be maintained above 19.5% and below 23.5%					
Maximum Impurities		1	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards					

NE = Not Established

C = Ceiling Limit



See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400 1-1993 format.



3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Oxygen is a colorless, odorless, oxidizing gas, or a colorless, odorless, cryogenic liquid. The chief health hazard presented by this gas at atmospheric pressures is respiratory system irritation after overexposure to high oxygen concentrations. The main physical hazard associated with releases of this gas is related to its oxidizing power. In high oxygen content atmospheres, common combustible materials can become highly flammable. The cryogenic liquid will rapidly boil to the gas at standard temperatures and pressures. The liquefied gas can cause frostbite to any contaminated tissue. Emergency responders must practice extreme caution when approaching oxygen releases because of the extreme fire potential.

OXYGEN GAS

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	0
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

LIQUID OXYGEN

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			X
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

See Section 16 for Definition of Ratings

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant route of overexposure for this gas or cryogenic liquid by inhalation. Skin and eye contact is also possible for the cryogenic liquid. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: Normally, air contains 21% oxygen. No health effects have been observed in people exposed to 50% Oxygen at 1 atm. for 24 hours or longer. High concentrations of this gas create an oxygen-rich environment. Individuals breathing such an atmosphere containing 51-100% Oxygen may experience nausea, dizziness, coughing, and bronchial irritation. Exposures to high Oxygen concentrations, especially at elevated pressures, can cause, hypothermia, increased depth of respiration, bradycardia, pulmonary discomfort, central nervous system effects (e.g., mood changes, dizziness), peripheral vasoconstriction, amblyopia (loss of vision), seizures, or death. Exposure levels to pure oxygen which have produced the adverse symptoms described above are summarized below.

DURATION OF EXPOSURE

5 hours
3 hours
30 minutes
5 minutes

PRESSURE OF OXYGEN

See level
3 atmospheres
4 atmospheres
7 atmospheres

NOTE: Pure oxygen at 1/3 atmospheric pressure can be inhaled for weeks without symptoms. Inhalation of pure oxygen for up to 16 hours per day for many days and 65% oxygen in air for extended periods does not cause symptoms of oxygen toxicity

OTHER POTENTIAL HEALTH EFFECTS: Contact of the skin or eyes with cryogenic liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. Ingestion and absorption through the skin are not considered significant routes of entry of oxygen into the body.

3. HAZARD IDENTIFICATION (Continued)

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to Oxygen may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-rich atmospheres. Symptoms of overexposure to Oxygen include nausea, dizziness, respiratory problems, lowering of body temperature, loss of vision, seizures, or death. Contact with cryogenic liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite.

CHRONIC: Long-term exposure to high atmospheric concentrations of oxygen at normal pressure or elevated pressure may produce severe thickening and scarring of lung tissues. Blood hemoglobin concentration decreases (thus reducing oxygen-carrying capacity) with prolonged exposure to high concentrations. See Section 11 (Toxicological Information) for additional information.

TARGET ORGANS: Hyperbaric Oxygen: Respiratory system and Central Nervous System. Cryogenic Liquid: Skin.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO OXYGEN WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus Personal Protective equipment (and fire retardant clothing, if appropriate) should be worn to protect against high oxygen content or super-heated gases in the event of fire.

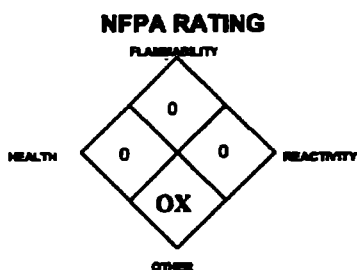
Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Supplemental oxygen is not normally appropriate. Victims tend to recover rapidly, when removed from the hypoxic exposure.

In case of frostbite, place the frostbitten part in warm water. **DO NOT USE HOT WATER.** If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s). Medical care providers should refer to Section 11 of this MSDS for additional information.

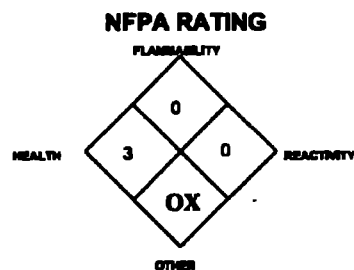
5. FIRE-FIGHTING MEASURES

OXYGEN GAS



See Section 16 for Definition of Ratings

LIQUID OXYGEN



FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %).

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

5. FIRE-FIGHTING MEASURES (Continued)

FIRE EXTINGUISHING MATERIALS: Non-flammable gas. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Oxygen does not burn, however, cylinders, when involved in fire, may rupture or burst in the heat of the fire. Oxygen will support and accelerate combustion. Common combustible materials will burn readily in elevated oxygen environments.

Water Spray: YES

Carbon Dioxide: YES

Foam: YES

Halon: YES

Dry Chemical: YES

Other: Any "ABC" Class.

RESPONSE TO FIRE INVOLVING CRYOGEN: Cryogenic oxygen may contribute to the ignition of any combustible material, including asphalt and wood. Extreme caution must be used when cryogenic oxygen storage vessels are involved in a fire. Cryogenic liquids can be particularly dangerous during fires because of their potential to rapidly freeze water. Careless use of water may cause heavy icing. Furthermore, relatively warm water greatly increases the evaporation rate of Oxygen. If large concentrations of Oxygen gas are present, the water vapor in the surrounding air will condense, creating a dense fog that may make it difficult to find fire exits or equipment. Liquid Oxygen, when exposed to the atmosphere, will produce a cloud of ice/fog in the air upon its release.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Do not enter areas which have more than 23.5% oxygen in the atmosphere, since a serious fire and explosion hazard exists. Remove all flammable and combustible materials from vicinity of a release, if it can be done without risk to firefighters. Direct water onto vessels to keep the vessels cool. Shut-off the flow of oxygen or move vessels from fire area if it can be done safely. Withdraw from the area in case of rising sounds from venting safety devices or any discoloration of vessels due to fire.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area and protect people. Minimum Personal Protective Equipment should be Level B: fire protective clothing, mechanically-resistant, fire protective gloves and Self-Contained Breathing Apparatus. In general, **DO NOT ENTER AN AREA IF THE OXYGEN CONTENT EXCEEDS 23.5%. USE VENTILATION TO REDUCE THE OXYGEN LEVELS.** Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Monitor the surrounding area for oxygen levels. The atmosphere must have at least 19.5 percent and less than 23.5% oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

RESPONSE TO CRYOGENIC RELEASE: Clear the affected area and allow the liquid to evaporate and the gas to dissipate. After the gas is formed, follow the instructions provided in the previous paragraph. If the area must be entered by emergency personnel, SCBA, Kevlar gloves, and appropriate foot and leg protection and fire protective clothing must be worn.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Do not eat or drink while handling chemicals. Be aware of any signs of overexposure to this gas (see Section 3, Hazard Information).

STORAGE AND HANDLING PRACTICES: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Post "No Smoking or Open Flames" signs in storage or use areas.

7. HANDLING and STORAGE (Continued)

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated, fireproof area, away from flammable materials and corrosive atmospheres. Store away from heat and ignition sources and out of direct sunlight. Do not store near elevators, corridors or loading docks. Do not allow area where cylinders are stored to exceed 52°C (125°F). Use only storage containers and equipment (pipes, valves, fittings to relieve pressure, etc.) designed for the storage of Oxygen. Do not store containers where they can come into contact with moisture.

Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting.

Keep Dewar flasks of liquid oxygen covered with loose fitting cap. This prevents air or moisture from entering the container, yet allows pressure to escape. Use only the stopper or plug supplied with the container. Ensure that ice does not form in the neck of flasks. If the neck of Dewar flask is blocked by ice or "frozen" air, follow owner's instruction for removing it. A plugged Dewar or storage flask may develop sufficient pressure to cause catastrophic failure. Ice can also cause pressure release valves to fail. Never tamper with pressure relief devices in valves and cylinders. The temperature of Liquid Oxygen is sufficiently cold to condense and freeze most gases. Consequently, there is a danger of pipes or vents becoming plugged. Liquid Oxygen should therefore be stored and handled under positive pressure or in a closed system to prevent the infiltration and solidification of air or other gases. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. For cryogenic liquids, refer to CGA P-12, *Safe Handling of Cryogenic Liquids*. Additionally, refer to CGA Bulletins G-4.3, "Commodity Specification for Oxygen", and G-4.1 "Cleaning Equipment for Oxygen Service".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., Nitrogen) before attempting repairs.

TANK CAR SHIPMENTS: Tank cars carrying Oxygen should be loaded and unloaded in strict accordance with tank-car owner's recommendations and all established on-site safety procedures. Appropriate personal protective equipment must be used during tank car operations (see Section 8). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level and wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel. Refrigerated Liquid Oxygen is capable of causing the ignition of asphalt. Transfers should be performed on concrete surfaces.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to maintain Oxygen levels between 19.5% and 23.5% in the work area. Local exhaust ventilation is preferred, because it prevents Oxygen dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of Oxygen.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% and below 23.5% in the workplace. Use supplied air respiratory protection during emergency response to a release of Oxygen. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), or equivalent State standards. DO NOT ENTER AN AREA IF THE OXYGEN CONTENT EXCEEDS 23.5%.

EYE PROTECTION: Safety glasses. Face-shields must be worn when using cryogenic Oxygen.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders of Oxygen. Use low-temperature protective gloves (e.g., Kevlar) when working with containers of Liquid Oxygen.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product, as well provide sufficient insulation from extreme cold.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY: 1.326 kg/m³ (0.083 lb/ft³)

SPECIFIC GRAVITY (air = 1): 1.105

SOLUBILITY IN WATER v/v @ 0°C (32°F): 4.9%

VAPOR PRESSURE (psia): Not applicable.

EXPANSION RATIO: 861 (cryogenic liquid).

COEFFICIENT WATER/OIL DISTRIBUTION: Log P -0.65

EVAPORATION RATE (nBuAc = 1): Not applicable.

FREEZING POINT: -218.8°C (-361.8°F)

BOILING POINT @ 1 atm.: -297.4°F (-183.0°C)

pH: Not applicable.

ODOR THRESHOLD: Not applicable. Odorless.

SPECIFIC VOLUME (ft³/lb): 12.1

APPEARANCE AND COLOR: Oxygen is a colorless, odorless gas or a colorless and odorless, cryogenic liquid.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of Oxygen. A release of the Refrigerated Liquid will be obvious as a result of the fog of atmospheric moisture which condenses in the vicinity of the release. An oxygen monitor can be used to detect oxygen levels.

10. STABILITY and REACTIVITY

STABILITY: Normally stable.

DECOMPOSITION PRODUCTS: None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Oxygen is incompatible with combustible and flammable materials, chlorinated hydrocarbons, hydrazine, reduced boron compounds, ethers, phosphine, phosphorous tribromide, phosphorous trioxide, tetrafluoroethylene, and compounds which readily form peroxides. The Refrigerated Liquid will cause asphalt to ignite.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Oxygen is the vital element in the atmosphere in which we live and breathe. The following toxicity data are for oxygen and are for exposure to high levels in extreme situations:

Cytogenetic Analysis System (hamster lung) 80 pph

TCLo (inhalation-woman) 12 pph for 10 minutes. Teratogenic effects.

TCLo (inhalation-human) 100 pph for 14 hours Pulmonary effects.

SUSPECTED CANCER AGENT: Oxygen is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC; therefore it is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Contact with rapidly expanding gases or the refrigerated liquid can cause frostbite and damage to exposed skin and eyes.

SENSITIZATION OF PRODUCT: Oxygen is not a sensitizer.

11. TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Oxygen on the human reproductive system.

Mutagenicity: Oxygen is not expected to cause mutagenic effects in humans. High concentrations of Oxygen at atmospheric pressure caused chromosomal aberrations and mutations in specific test animal tissues.

Embryotoxicity: Oxygen is not expected to cause embryotoxic effects in humans.

Teratogenicity: Oxygen is not expected to cause teratogenic effects in humans. Exposure of pregnant hamsters to 3-4 atmospheres of 100% oxygen for periods of 2-3 hours on days 6, 7, and 8 of pregnancy produced teratogenic effects in small, but significant number of fetuses.

Reproductive Toxicity: Oxygen is not expected to cause adverse reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory conditions may be aggravated by overexposure to Oxygen

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce overexposure. Symptoms of overexposure usually are relieved quickly. Immediate sedation and anticonvulsive therapy should be provided, as needed.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for this compound.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Oxygen occurs naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are available for Oxygen.

OXYGEN Log K_{ow} = -0.65, oxygen does not bioconcentrate in aquatic organisms

EFFECT OF MATERIAL ON PLANTS OR ANIMALS: No adverse effect is anticipated to occur to animal or plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on Oxygen's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to Airgas Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

For Oxygen, Gas:

PROPER SHIPPING NAME:	Oxygen, compressed
HAZARD CLASS NUMBER and DESCRIPTION:	2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER	UN 1072
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Non-Flammable Gas, Oxidizer
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996):	122

For Oxygen, Liquid:

PROPER SHIPPING NAME:	Oxygen, refrigerated liquid
HAZARD CLASS NUMBER and DESCRIPTION:	2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER.	UN 1073
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED	Non-Flammable Gas, Oxidizer
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996):	122

14. TRANSPORTATION INFORMATION (Continued)

MARINE POLLUTANT: Oxygen is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Oxygen is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable

CANADIAN DSL/NDSL INVENTORY STATUS: Oxygen is on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Oxygen is on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: Oxygen is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: No

California - Permissible Exposure Limits for Chemical Contaminants: No

Florida - Substance List: Oxygen

Illinois - Toxic Substance List: No.

Kansas - Section 302/313 List: No.

Massachusetts - Substance List: Oxygen

Minnesota - List of Hazardous Substances: No.

Michigan - Critical Materials Register: No

Missouri - Employer Information/Toxic Substance List: No

New Jersey - Right to Know Hazardous Substance List: Oxygen

North Dakota - List of Hazardous Chemicals, Reportable Quantities: No

Pennsylvania - Hazardous Substance List: Oxygen

Rhode Island - Hazardous Substance List: Oxygen

Texas - Hazardous Substance List: No.

West Virginia - Hazardous Substance List: No.

Wisconsin - Toxic and Hazardous Substances: No

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Oxygen is not on the California Proposition 65 lists

LABELING (for Liquid):

ALWAYS KEEP CONTAINER IN UPRIGHT POSITION.

WARNING:

EXTREMELY COLD, OXIDIZING LIQUID AND GAS UNDER PRESSURE.

VIGOROUSLY ACCELERATES COMBUSTION.

COMBUSTIBLES IN CONTACT WITH LIQUID OXYGEN MAY EXPLODE ON IGNITION OR CONTACT.

CAN CAUSE SEVERE FROSTBITE.

Keep oil, grease, and combustibles away.

Use only with equipment cleaned for oxygen service.

Do not get liquid in eyes, on skin, or clothing.

For liquid withdrawal, wear face shield and gloves.

Do not drop. Use hand truck for container movement.

Avoid spills. Do not walk on or roll equipment over spills.

Close valve after each use and when empty.

Use in accordance with the Material Safety Data Sheet.

FIRST-AID:

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

15. REGULATORY INFORMATION (Continued)

LABELING (for Compressed Gas):

WARNING:

HIGH PRESSURE OXIDIZING GAS.
VIGOROUSLY ACCELERATES COMBUSTION.

Keep oil and grease away.

Open valve slowly.

Use only with equipment cleaned for oxygen service and rated for cylinder pressure.

Close valve after each use and when empty

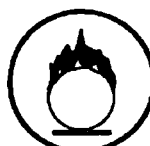
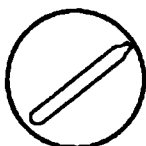
Use in accordance with the Material Safety Data Sheet.

DO NOT REMOVE THIS PRODUCT LABEL.

CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gases

Class C: Oxidizer



16. OTHER INFORMATION

PREPARED BY:

CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. AIRGAS, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, AIRGAS, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS # - This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

TLV - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (TWA), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (C). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration.

PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (*Federal Register* 58 35338-35351 and 58 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. The DFG - MAK is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. NIOSH is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (OSHA). NIOSH issues exposure guidelines called Recommended Exposure Levels (RELs). When no exposure guidelines are established, an entry of NE is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard:

0 (minimal acute or chronic exposure hazard); 1 (slight acute or chronic exposure hazard); 2 (moderate acute or significant chronic exposure hazard); 3 (severe acute exposure hazard, onetime overexposure can result in permanent injury and may be fatal); 4 (extreme acute exposure hazard, onetime overexposure can be fatal). Flammability Hazard: 0 (minimal hazard); 1 (materials that require substantial pre-heating before burning); 2 (combustible liquid or solids, liquids with a flash point of 38-93°C [100-200°F]); 3 (Class IB and IC flammable liquids with flash points below 38°C [100°F]); 4 (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: 0 (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); 2 (materials that are unstable but do not detonate or which can react violently with water); 3 (materials that can detonate when initiated or which can react explosively with water); 4 (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard:

0 (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); 1 (materials that on exposure under fire conditions could cause irritation or minor residual injury); 2 (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); 3 (materials that can on short exposure could cause serious temporary or residual injury); 4 (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (NFPA). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature - The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: LD₅₀ - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; LC₅₀ - Lethal Concentration (gases) which kills 50% of the exposed animals; ppm concentration expressed in parts of material per million parts of air or water; mg/m³ concentration expressed in weight of substance per volume of air; mg/kg quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: IARC - the International Agency for Research on Cancer; NTP - the National Toxicology Program; RTECS - the Registry of Toxic Effects of Chemical Substances; OSHA and CAL/OSHA. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include TDLo, the lowest dose to cause a symptom; and TCLo, the lowest concentration to cause a symptom; TD₀₁, LDLo, and LD₀₁, or TC, TC₀₁, LCLo, and LCo, the lowest dose (or concentration) to cause lethal or toxic effects. BEI - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information. EC is the effect concentration in water.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. EPA is the U.S. Environmental Protection Agency. WHMIS is the Canadian Workplace Hazardous Materials Information System. DOT and TC are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (SARA), the Canadian Domestic/Non-Domestic Substances List (DSL/NDL); the U.S. Toxic Substances Control Act (TSCA), Marine Pollutant status according to the DOT; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), and various state regulations.

Material Safety Data Sheet



SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

DELO EXTENDED LIFE COOLANT 50/50 NITRITE FREE - BITTERANT

Product Use: Antifreeze/Coolant

Product Number(s): CPS227071

Company Identification

Chevron Products Company
a division of Chevron U S A. Inc
6001 Bollinger Canyon Rd
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

Chevron Emergency Information Center Located in the USA International collect calls accepted. (800) 231-0623 or (510) 231-0623

Product Information

email : lubemsds@chevron.com
Product Information (800) LUBE TEK

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Ethylene Glycol	107-21-1	30 - 60 %wt/wt
Sodium 2-ethylhexanoate	19766-89-3	1 - 4.9 %wt/wt

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- MAY BE HARMFUL OR FATAL IF SWALLOWED
 - MAY CAUSE DIZZINESS, DROWSINESS AND REDUCED ALERTNESS
 - CONTAINS MATERIAL THAT MAY CAUSE HARM TO THE UNBORN CHILD
 - CONTAINS MATERIAL THAT MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS BASED ON ANIMAL DATA
 - CONTAINS MATERIAL THAT MAY CAUSE DAMAGE TO:
 - KIDNEY
- *****

Revision Number: 2
Revision Date: MAY 03, 2012

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DELO EXTENDED LIFE COOLANT
50/50 NITRITE FREE - BITTERANT
MSDS : 20491

HESI00320

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Toxic, may be harmful or fatal if swallowed.

Inhalation: Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: Contains material that may cause adverse reproductive effects if swallowed based on animal data. Contains material that may cause harm to the unborn child based on animal data.

Target Organs: Contains material that may cause damage to the following organ(s) following repeated inhalation at concentrations above the recommended exposure limit: Kidney.

See Section 11 for additional information. Risk depends on duration and level of exposure.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs. Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue or if any other symptoms develop.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health 2 Flammability 1 Reactivity 0

FLAMMABLE PROPERTIES:

Flashpoint: Not Applicable

Autoignition: No data available

Flammability (Explosive) Limits (% by volume in air): Lower Not Applicable Upper Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames. Dry Chemical, CO₂, AFFF Foam or alcohol resistant foam.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including

self-contained breathing apparatus

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling.

General Handling Information: Do not taste or swallow antifreeze or solution. Keep out of the reach of children and animals.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

General Storage Information: Do not store in open or unlabeled containers.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include Natural rubber, Neoprene, Nitrile Rubber, Polyvinyl Chloride (PVC or Vinyl).

Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors, Dusts and Mists.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Ethylene Glycol	ACGIH	--	--	100 mg/m3	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Yellow

Physical State: Liquid

Odor: Faint or Mild

pH: No data available

Vapor Pressure: No data available

Vapor Density (Air = 1): >1 (Typical)

Boiling Point: 100°C (212°F) (Estimated)

Solubility: Soluble in water

Freezing Point: -34°C (-29.2°F) (Estimated)

Specific Gravity: 1.08 - 1.09 @ 15.6°C (60.1°F) / 15.6°C (60.1°F) (Estimated)

Viscosity: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Hazardous Decomposition Products: Aldehydes (Elevated temperatures), Ketones (Elevated temperatures)

Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product.

components

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components

Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains ethylene glycol (EG). The toxicity of EG via inhalation or skin contact is expected to be slight at room temperature. The estimated oral lethal dose is about 100 cc (3.3 oz.) for an adult human. Ethylene glycol is oxidized to oxalic acid which results in the deposition of calcium oxalate crystals mainly in the brain and kidneys. Early signs and symptoms of EG poisoning may resemble those of alcohol intoxication. Later, the victim may experience nausea, vomiting, weakness, abdominal and muscle pain, difficulty in breathing and decreased urine output. When EG was heated above the boiling point of water, vapors formed which reportedly caused unconsciousness, increased lymphocyte count, and a rapid, jerky movement of the eyes in persons chronically exposed. When EG was administered orally to pregnant rats and mice, there was an increase in fetal deaths and birth defects. Some of these effects occurred at doses that had no toxic effects on the mothers. We are not aware of any reports that EG causes reproductive toxicity in human beings.

2-Ethylhexanoic acid (2-EXA) caused an increase in liver size and enzyme levels when repeatedly administered to rats via the diet. When administered to pregnant rats by gavage or in drinking water, 2-EXA caused teratogenicity (birth defects) and delayed postnatal development of the pups. Additionally, 2-EXA impaired female fertility in rats. Birth defects were seen in the offspring of mice who were administered sodium 2-ethylhexanoate via intraperitoneal injection during pregnancy.

SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICITY

This material is not expected to be harmful to aquatic organisms. The product has not been tested. The statement has been derived from the properties of the individual components.

ENVIRONMENTAL FATE

Ready Biodegradability: This material is expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13. DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PROPRIETARY ANTIFREEZE PREPARATION IN NON-BULK PACKAGING, NOT REGULATED FOR TRANSPORT UNDER 49 CFR

Additional Information: Bulk shipments containing a reportable quantity (RQ, 5000 pounds or more) of ethylene glycol in a single packaging are transported as hazardous material. The shipping description is UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ETHYLENE GLYCOL CONTAINS BITTERANT), 9, III, RQ (ETHYLENE GLYCOL)

IMO/IMDG Shipping Description: NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORTATION UNDER THE IMDG CODE

ICAO/IATA Shipping Description: Anti-freeze Preparations, Proprietary, NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:	1	Immediate (Acute) Health Effects	YES
	2	Delayed (Chronic) Health Effects	YES
	3	Fire Hazard	NO
	4	Sudden Release of Pressure Hazard	NO
	5	Reactivity Hazard	NO

REGULATORY LISTS SEARCHED

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated:
Ethylene Glycol 05, 06, 07

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), EINECS (European Union), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States)

NEW JERSEY RTK CLASSIFICATION:

Refer to components listed in Section 2

WHMIS CLASSIFICATION:

Class D, Division 1, Subdivision B: Toxic Material -
Acute Lethality

Class D, Division 2, Subdivision A: Very Toxic Material -
Teratogenicity and Embryotoxicity
Reproductive Toxicity

Class D, Division 2, Subdivision B: Toxic Material -

Chronic Toxic Effects

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health 2 Flammability 1 Reactivity 0

HMIS RATINGS: Health 2* Flammability 1 Reactivity 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE - Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator) These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings)

LABEL RECOMMENDATION:

Label Category ANTIFREEZE/COOLANT 3 - AFC3

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet:
1, 2, 3, 7, 11, 12, 13, 14, 15, 16

Revision Date: MAY 03, 2012

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

MATERIAL SAFETY DATA SHEET**Product Trade Name: BC-140****Revision Date: 20-Dec-2012****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Trade Name: BC-140
Synonyms: None
Chemical Family: Blend
Application: Crosslinker

Manufacturer/Supplier Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Monoethanolamine borate	26038-87-9	30 - 60%	Not applicable	Not applicable
Ethylene glycol	107-21-1	10 - 30%	100 mg/m ³	50 ppm CEIL

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation May cause headache, dizziness, and other central nervous system effects May be harmful if swallowed. May cause birth defects. Repeated overexposure may cause liver and kidney effects

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen Get medical attention

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing

Ingestion Do not induce vomiting Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 2, Flammability 0, Reactivity 0
HMIS Ratings: Health 2, Flammability 0, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing Avoid breathing vapors Wash hands after use Launder contaminated clothing before reuse

Storage Information Store away from oxidizers Store in a cool well ventilated area Keep container closed when not in use Product has a shelf life of 36 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Local exhaust ventilation should be used in areas without good cross ventilation

Respiratory Protection Organic vapor respirator

Hand Protection Impervious rubber gloves

Skin Protection Rubber apron.

Eye Protection Chemical goggles, also wear a face shield if splashing hazard exists

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
Color: Dark green
Odor: Mild

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	7.28
Specific Gravity @ 20 C (Water=1):	1.17 - 1.2
Density @ 20 C (lbs./gallon):	9.75 - 10.0
Bulk Density @ 20 C (lbs./ft ³):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers Dehydrating agents
Hazardous Decomposition Products	Toxic fumes Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation
Eye Contact	May cause severe eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach May cause abdominal pain, vomiting, nausea, and diarrhea May cause heart, kidney and brain disorders
Aggravated Medical Conditions	Skin disorders Eye ailments. Liver and kidney disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause kidney damage. Prolonged or repeated exposure may cause liver, heart, blood and brain damage Prolonged or repeated exposure may cause reproductive system damage. Prolonged or repeated exposure may cause embryo and fetus toxicity
Other Information	None known

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely
Hazardous Substances Not applicable

EPA SARA (311,312) Hazard
Class Acute Health Hazard
Chronic Health Hazard

EPA SARA (313) Chemicals This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372
Ethylene Glycol//107-21-1

EPA CERCLA/Superfund
Reportable Spill Quantity EPA Reportable Spill Quantity is 1674 Gallons based on Ethylene glycol (CAS. 107-21-1)

EPA RCRA Hazardous Waste
Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law One or more components listed

NJ Right-to-Know Law One or more components listed

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt

WHMIS Hazard Class D1A Very Toxic Materials
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BE-9**

Revision Date: 16-Apr-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BE-9
Synonyms: None
Chemical Family: Solution
Application: Biocide

Manufacturer/Supplier: Halliburton Energy Services, Inc
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Tributyl tetradecyl phosphonium chloride	81741-28-8	5 - 10%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye and skin burns May cause respiratory irritation May be harmful if swallowed May be harmful if inhaled

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse. Remove contaminated shoes and discard.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion If swallowed, do NOT induce vomiting. Give victim two glasses of water, Call a physician immediately. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases Do not allow runoff to enter waterways. Use water spray to cool fire exposed surfaces.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 3, Flammability 0, Reactivity 0

HMIS Ratings: Health 3, Flammability 0, Physical Hazard 0 , PPE F

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe Contain spill with sand or other inert materials. Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing Wash hands after use Launder contaminated clothing before reuse Do NOT consume food, drink, or tobacco in contaminated areas

Storage Information Store in a cool well ventilated area Keep container closed when not in use Store away from direct sunlight Store in a dry location Store in a manner to prevent commingling with incompatible materials. Store away from alkalis Store away from reducing agents

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Local exhaust ventilation should be used in areas without good cross ventilation

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715 2009, or equivalent respirator when using this product Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional

Dust/mist respirator (N95, P2/P3)

Hand Protection	Impervious rubber gloves Neoprene gloves. Polyvinylchloride gloves
Skin Protection	Wear impervious protective clothing, including boots, gloves, lab coat, apron, rain jacket, pants or coverall, as appropriate, to prevent skin contact
Eye Protection	Chemical goggles, also wear a face shield if splashing hazard exists
Other Precautions	Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Slight
pH:	6-8
Specific Gravity @ 20 C (Water=1):	0.95-1.00
Density @ 20 C (lbs./gallon):	8.12
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	212
Boiling Point/Range (C):	100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Miscible
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	55-65
Partition Coefficient/n-Octanol/Water:	< 3
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Reducing agents. Strong alkalis
Hazardous Decomposition Products	Chlorine Phosphorus acids Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
------------------------------------	---------------------------------

Symptoms related to exposure
Acute Toxicity

Inhalation	May cause respiratory irritation May be harmful if inhaled
Eye Contact	May cause eye burns
Skin Contact	May cause skin burns Harmful if absorbed through the skin
Ingestion	May be harmful if swallowed

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tributyl tetradecyl phosphonium chloride	81741-28-8	< 2000 mg/kg (Rat)	No data available	0.9 mg/L (Rat)

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity: LC50 (96 hour) 0.46 mg/L (Oncorhynchus mykiss)
LC50 (96 hour) 0.06 mg/L (Lepomis macrochirus)
LC50 (96 hour) 0.58 mg/L (fish)
Acute Crustaceans Toxicity: TLM96 1.6 mg/L (Crangon crangon) TLM48 0.025 mg/L (Daphnia magna)
Acute Algae Toxicity: Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Tributyl tetradecyl phosphonium chloride	81741-28-8	No information available	LC50(96h) 0.46 mg/L (Oncorhynchus mykiss) LC50(96h) 0.06 mg/L (Lepomis macrochirus)	No information available	EC50(48h) 0.025 mg/L (Daphnia magna) TLM96 1.6 mg/L (Crangon crangon)

12.2 Persistence and degradability

No information available

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations
Incineration recommended in approved incinerator according to federal, state, and local regulations

Contaminated Packaging

Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

US DOT

UN Number: UN2922

UN Proper Shipping Name: Corrosive Liquid, Toxic, N O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
NAERG: NAERG 154

US DOT Bulk
DOT (Bulk) Not Applicable

Canadian TDG ul0
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

IMDG/IMO
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
EMS: EmS F-A, S-B

IATA/ICAO
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

Labels: Corrosive
Toxic

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law Does not apply

NJ Right-to-Know Law Does not apply

PA Right-to-Know Law Does not apply

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt

WHMIS Hazard Class D1A Very Toxic Materials
E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Section 15 Regulatory Information

Additional information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user

*****END OF MSDS*****

MATERIAL SAFETY DATA SHEET

Product Trade Name: FR-66

Revision Date: 14-Feb-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FR-66
Synonyms: None
Chemical Family: Blend
Application: Friction Reducer

Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone 1-580-251-4335
e-mail fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation May be harmful if swallowed

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200
Flash Point/Range (C):	> 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	> 419
Autoignition Temperature (C):	> 215
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical
Special Exposure Hazards	Decomposition in fire may produce toxic gases Use water spray to cool fire exposed surfaces
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1, Flammability 0, Physical Hazard 0 , PPE C

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe Contain spill with sand or other inert materials Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing Avoid breathing vapors Wash hands after use Launder contaminated clothing before reuse Matenal is slippery underfoot Avoid breathing mist
Storage Information	Store away from oxidizers Keep container closed when not in use Store in a cool, dry location Store in a well ventilated area Keep from freezing Product has a shelf life of 6 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation
Respiratory Protection	Not normally needed. But if significant exposures are possible then the following respirator is recommended Organic vapor respirator
Hand Protection	Impervious rubber gloves
Skin Protection	Rubber apron
Eye Protection	Chemical goggles, also wear a face shield if splashing hazard exists
Other Precautions	Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White
Odor:	Sweet hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.06
Density @ 20 C (lbs./gallon):	8.83
Bulk Density @ 20 C (lbs/ft ³):	65.4
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	< 14
Freezing Point/Range (C):	< -10
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	50
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers
Hazardous Decomposition Products	Oxides of nitrogen Carbon monoxide and carbon dioxide Chlorine
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	Inhalation of mist or heated vapors may cause respiratory irritation
Skin Contact	May cause skin defatting with prolonged exposure
Eye Contact	May cause moderate eye irritation
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal.
Aggravated Medical Conditions	None known
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
Other Information	None known

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335
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Disclaimer Statement

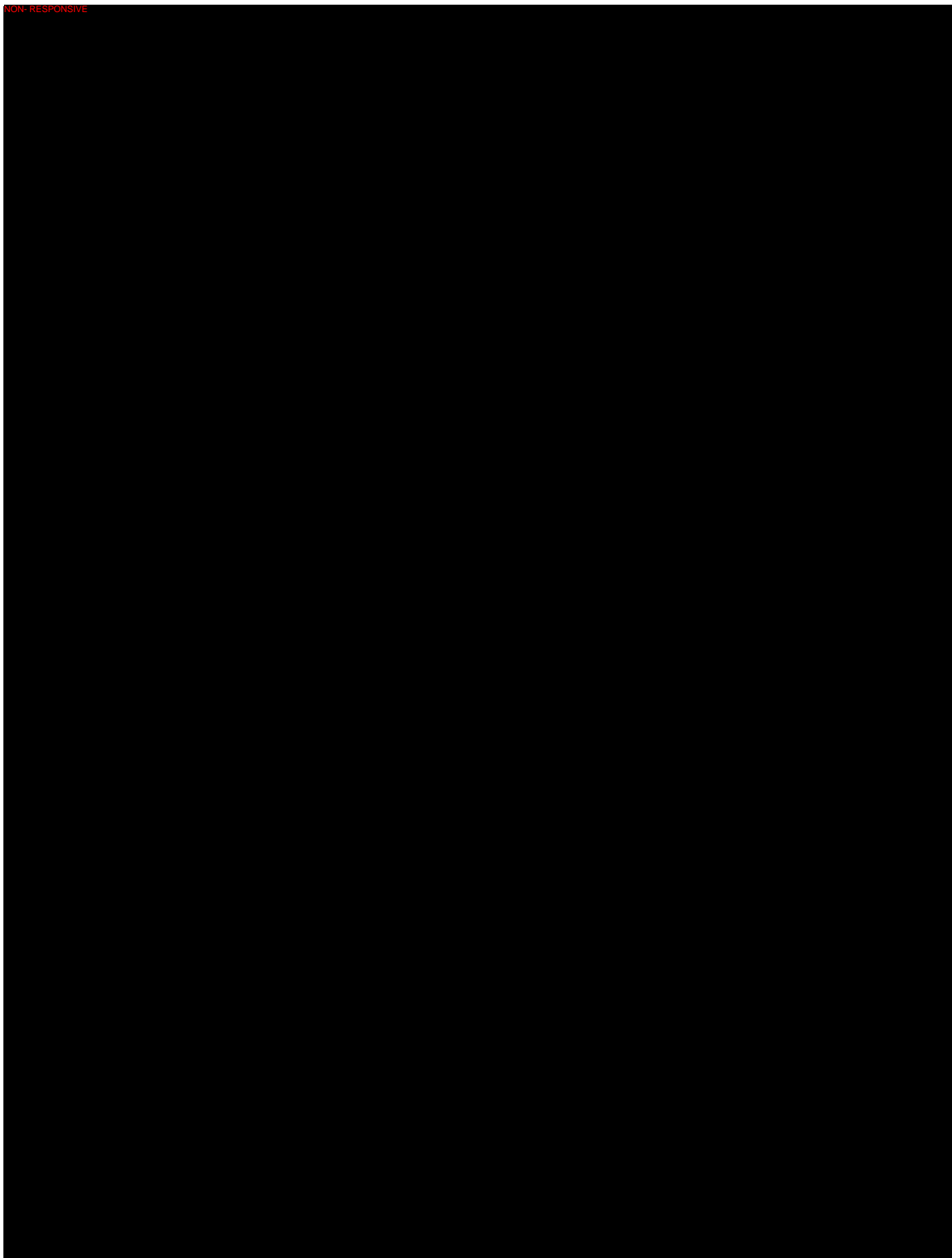
This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

NON-RESPONSIVE





NON-RESPONSIVE

NON-RESPONSIVE

NON-RESPONSIVE

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HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: HYDROCHLORIC ACID 10-30%

Revision Date: 19-Apr-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HYDROCHLORIC ACID 10-30%
Synonyms: None
Chemical Family: Inorganic acid
Application: Solvent
Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrochloric acid	7647-01-0	10 - 30%	2 ppm	5 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory burns May be harmful if swallowed

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards May form explosive mixtures with strong alkalis Decomposition in fire may produce toxic gases Reaction with steel and certain other metals generates flammable hydrogen gas Do not allow runoff to enter waterways

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 3, Flammability 0, Reactivity 1

HMIS Ratings: Health 3, Flammability 0, Reactivity 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors Wash hands after use Launder contaminated clothing before reuse

Storage Information Store away from alkalis Store in a cool well ventilated area. Keep container closed when not in use

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Local exhaust ventilation should be used in areas without good cross ventilation

Respiratory Protection Acid gas respirator

Hand Protection Impervious rubber gloves

Skin Protection Full protective chemical resistant clothing Rubber boots

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Clear colorless
Odor:	Pungent acrid
pH:	0.8
Specific Gravity @ 20 C (Water=1):	1.16
Density @ 20 C (lbs./gallon):	9.66
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	230
Boiling Point/Range (C):	110
Freezing Point/Range (F):	-50
Freezing Point/Range (C):	-46
Vapor Pressure @ 20 C (mmHg):	26
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	35
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	36.5

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong alkalis
Hazardous Decomposition Products	Flammable hydrogen gas Chlorine Hydrogen sulfide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	Causes severe respiratory irritation
Skin Contact	May cause skin burns.
Eye Contact	May cause eye burns.
Ingestion	Causes burns of the mouth, throat and stomach
Aggravated Medical Conditions	Skin disorders
Chronic Effects/Carcinogenicity	Prolonged, excessive exposure may cause erosion of the teeth
Other Information	None known
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

HYDROCHLORIC ACID 10-30%
Page 3 of 6

Inhalation Toxicity:	LC50 3124 ppm/1 hr (Rat)
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1789,Hydrochloric Acid Solution, 8, II
RQ (Hydrochloric Acid - 2273 kg)
NAERG 157

Canadian TDG

Hydrochloric Acid Solution, 8, UN1789, II

ADR

UN1789,Hydrochloric Acid Solution, 8, II

Air Transportation

ICAO/IATA

UN1789,Hydrochloric Acid Solution, 8, II

RQ (Hydrochloric Acid - 2273 kg)

Sea Transportation

IMDG

UN1789, Hydrochloric Acid Solution, 8, II
RQ (Hydrochloric Acid - 2273 kg)
EmS F-A, S-B

Other Transportation Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 1592 Gallons based on Hydrochloric acid (CAS 7647-01-0).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed
Canadian Regulations	
Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****



Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron ATF HD 389

Product Use: Automatic Transmission Fluid

Product Number(s): 226534

Synonyms: Chevron Automatic Transmission Fluid HD-389

Company Identification

Chevron Products Company

a division of Chevron U.S.A. Inc

6001 Bollinger Canyon Rd

San Ramon, CA 94583

United States of America

www.chevronlubricants.com

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

Chevron Emergency Information Center Located in the USA International collect calls accepted. (800)

231-0623 or (510) 231-0623

Product Information

email lubemsds@chevron.com

Product Information: 1 (800) 582-3835, LUBETEK@chevron.com

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	70 - 99 %wt/wt

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- TOXIC TO AQUATIC ORGANISMS MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response Not expected to be harmful to internal organs if absorbed through the skin High-Pressure Equipment Information Accidental high-velocity injection under the skin of materials of this type may result in serious injury Seek medical attention at once should an

accident like this occur. The initial wound at the injection site may not appear to be serious at first, but, if left untreated, could result in disfigurement or amputation of the affected part.

Ingestion: Not expected to be harmful if swallowed.

Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.

Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

Note to Physicians: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

SECTION 5 FIRE FIGHTING MEASURES

Leaks/ruptures in high pressure system using materials of this type can create a fire hazard when in the vicinity of ignition sources (eg. open flame, pilot lights, sparks, or electric arcs).

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: (Cleveland Open Cup) 178 °C (352 °F) Minimum

Autoignition: No data available

Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. See Section 7 for proper handling and storage. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: DO NOT USE IN HIGH PRESSURE SYSTEMS in the vicinity of flames, sparks and hot surfaces. Use only in well ventilated areas. Keep container closed.

Keep out of the reach of children.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include 4H (PE/EVAL), Nitrile Rubber, Silver Shield,

Viton

Respiratory Protection: No respiratory protection is normally required

If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge. Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	—	—
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	—	—	—

Consult local authorities for appropriate values

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification

Color: Red

Physical State: Liquid

Odor: Petroleum odor

pH: Not Applicable

Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)

Vapor Density (Air = 1): >1

Boiling Point: 315°C (599°F)

Solubility: Soluble in hydrocarbons, insoluble in water

Freezing Point: Not Applicable @ 15.6°C (60.1°F) / 15.6°C (60.1°F)

Density: 0.858 kg/l @ 15°C (59°F) (Typical)

Viscosity: 7 mm²/s @ 100°C (212°F) (Typical)

Evaporation Rate: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Hazardous Decomposition Products: None known (None expected)

Hazardous Polymerization: Hazardous polymerization will not occur

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.

Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as, carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3).

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE

Ready Biodegradability: This material is not expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: NOT REGULATED AS HAZARDOUS MATERIAL UNDER 49 CFR,
OPTIONAL DISCLOSURE: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ALKYL PHOSPHITES, OLEYLAMINE), 9, III, MARINE POLLUTANT (ALKYL PHOSPHITES, OLEYLAMINE)

IMO/IMDG Shipping Description: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (ALKYL PHOSPHITES, OLEYLAMINE), 9, III, MARINE POLLUTANT (ALKYL PHOSPHITES, OLEYLAMINE)

ICAO/IATA Shipping Description: UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID,

N O S (ALKYL PHOSPHITES, OLEYLAMINE), 9, III

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:	1	Immediate (Acute) Health Effects	NO
	2	Delayed (Chronic) Health Effects	NO
	3	Fire Hazard	NO
	4	Sudden Release of Pressure Hazard	NO
	5	Reactivity Hazard	NO

REGULATORY LISTS SEARCHED

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

No components of this material were found on the regulatory lists above

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements AICS (Australia), DSL (Canada), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States) One or more components is listed on ELINCS (European Union) Secondary notification by the importer may be required. All other components are listed or exempted from listing on EINECS

NEW JERSEY RTK CLASSIFICATION:

Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N J S A 34.5A-1 et seq , the product is to be identified as follows PETROLEUM OIL (Automatic transmission fluid)

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability 1 Reactivity 0

HMIS RATINGS: Health: 1 Flammability 1 Reactivity. 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE.- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:

Label Category INDUSTRIAL OIL 1 - IND1

REVISION STATEMENT: This revision updates the following sections of this Safety Data Sheet
1,2,9,12,14,15,16

Revision Date: January 17, 2014

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration
NCEL - New Chemical Exposure Limit	EPA - Environmental Protection Agency
SCBA - Self-Contained Breathing Apparatus	

Prepared according to the 29 CFR 1910 1200 (2012) by Chevron Energy Technology Company, 6001 Bollinger Canyon Road San Ramon, CA 94583

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.



Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Delo® 400 LE SAE 15W-40

Product Use: Engine Oil
Product Number(s): CPS222220
Company Identification
Chevron Products Company
Global Lubricants
6001 Bollinger Canyon Rd
San Ramon, CA 94583
United States of America
www.chevron-lubricants.com

Transportation Emergency Response

CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency

Chevron Emergency Information Center: Located in the USA. International collect calls accepted (800) 231-0623 or (510) 231-0623

Product Information

email : lubemsds@chevrontexaco.com

Product Information: (800) LUBE TEK

MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	80 - 100 %weight
Zinc alkyl dithiophosphate	68649-42-3	1 - 5 %weight

SECTION 3 HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin

Ingestion: Not expected to be harmful if swallowed.

Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required As a precaution, remove contact lenses, if worn, and flush eyes

Revision Number 0
Revision Date: July 24, 2006

1 of ##NUMPAGES##

Delo® 400 LE SAE 15W-40
MSDS 17108

HESI00365

with water

Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.

Inhalation: No specific first aid measures are required. If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200) Not classified by OSHA as flammable or combustible

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: (Cleveland Open Cup) 200 °C (392 °F) (Min)

Autoignition: No Data Available

Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Keep out of the reach of children.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA) 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of

Static, Lightning, and Stray Currents'

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.

Respiratory Protection: No respiratory protection is normally required.

If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	--	--
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	--	--	--

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Brown

Physical State: Liquid

Odor: Petroleum odor

pH: Not Applicable

Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)

Vapor Density (Air = 1): >1

Boiling Point: >315°C (599°F)

Solubility: Soluble in hydrocarbons; insoluble in water

Freezing Point: Not Applicable
Melting Point: Not Applicable
Specific Gravity: 0.87 - 0.9 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)
Volatile Organic Compounds (VOC): 1.1 %weight
Viscosity: 6.6 cSt @ 100°C (212°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc

Hazardous Decomposition Products: None known (None expected)

Hazardous Polymerization: Hazardous polymerization will not occur

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components

Skin Sensitization: No product toxicology data available

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as: carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen (A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3). During use in engines, contamination of oil with low levels of cancer-causing combustion products occurs. Used motor oils have been shown to cause skin cancer in mice following repeated application and continuous exposure. Brief or intermittent skin contact with used motor oil is not expected to have serious effects in humans if the oil is thoroughly removed by washing with soap and water.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE

This material is not expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information: NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE.

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:	1. Immediate (Acute) Health Effects.	NO
	2. Delayed (Chronic) Health Effects.	NO
	3. Fire Hazard:	NO
	4. Sudden Release of Pressure Hazard:	NO
	5. Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated
Zinc alkyl dithiophosphate 03, 06

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: DSL (Canada), ENCS (Japan), IECSC (China), KECI (Korea), PICCS (Philippines), TSCA (United States)

One or more components is listed on ELINCS (European Union). Secondary notification by the importer may be required. All other components are listed or exempted from listing on EINECS.

One or more components does not comply with the following chemical inventory requirements: AICS (Australia)

NEW JERSEY RTK CLASSIFICATION:

Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34.5A-1 et seq., the product is to be

identified as follows: PETROLEUM OIL (Motor oil)

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE - Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:

Label Category: ENGINE OIL 1 - ENG1

REVISION STATEMENT: This is a new Material Safety Data Sheet.

Revision Date: July 24, 2006

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Chevron Rock Drill Oil Vistac®

Product Use: Rock Drill Oil

Product Number(s): CPS232342, CPS232343, CPS232496, CPS232497, CPS232498, CPS232499

Synonyms: Chevron Rock Drill Oil Vistac® ISO 100, Chevron Rock Drill Oil Vistac® ISO 150, Chevron Rock Drill Oil Vistac® ISO 220, Chevron Rock Drill Oil Vistac® ISO 32, Chevron Rock Drill Oil Vistac® ISO 320, Chevron Rock Drill Oil Vistac® ISO 46, Chevron Rock Drill Oil Vistac® ISO 460

Company Identification
Chevron Products Company
Global Lubricants
6001 Bollinger Canyon Rd
San Ramon, CA 94583
United States of America
www.chevronlubricants.com

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887

Health Emergency
Chevron Emergency Information Center: Located in the USA International collect calls accepted.
(800) 231-0623 or (510) 231-0623

Product Information
email : lubemsds@Chevron.com
Product Information: (800) LUBE TEK
MSDS Requests: (800) 414-6737

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Highly refined mineral oil (C15 - C50)	Mixture	80 - 100 %weight

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

- OIL MIST MAY CAUSE RESPIRATORY IRRITATION

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation

Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Not expected to be harmful if swallowed.
Inhalation: Not expected to be harmful if inhaled. Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit. Symptoms of respiratory irritation may include coughing and difficulty breathing.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.
Skin: No specific first aid measures are required. As a precaution, remove clothing and shoes if contaminated. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: No specific first aid measures are required. Do not induce vomiting. As a precaution, get medical advice.
Inhalation: If exposed to excessive amounts of material in air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: (Cleveland Open Cup) 162 °C (324 °F) (Min)

Autot ignition: No Data Available

Flammability (Explosive) Limits (% by volume in air): Lower: Not Applicable Upper: Not Applicable

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO₂) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable

containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Do not breathe oil mist at concentrations above the recommended mineral oil mist exposure limit.

General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT

Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: 4H (PE/EVAL), Nitrile Rubber, Silver Shield, Viton.

Respiratory Protection:

If user operations generate an oil mist, determine if airborne concentrations are below the occupational exposure limit for mineral oil mist. If not, wear an approved respirator that provides adequate protection from the measured concentrations of this material. For air-purifying respirators use a particulate cartridge.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Celling	Notation
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Highly refined mineral oil (C15 - C50)	ACGIH	5 mg/m3	10 mg/m3	-	-
Highly refined mineral oil (C15 - C50)	OSHA Z-1	5 mg/m3	-	-	-

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Amber

Physical State: Liquid

Odor: Petroleum odor

pH: Not Applicable

Vapor Pressure: <0.01 mmHg @ 37.8 °C (100 °F)

Vapor Density (Air = 1): >1

Boiling Point: >315°C (599°F)

Solubility: Soluble in hydrocarbons; insoluble in water

Freezing Point: Not Applicable

Specific Gravity: 0.87 - 0.92 @ 15.6°C (60.1°F) / 15.6°C (60.1°F)

Viscosity: 28.8 cSt @ 40°C (104°F) (Min)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

Hazardous Decomposition Products: None known (None expected)

Hazardous Polymerization: Hazardous polymerization will not occur

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.

Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.

Skin Sensitization: No product toxicology data available

Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as: carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B). These oils have not been classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as: confirmed human carcinogen

(A1), suspected human carcinogen (A2), or confirmed animal carcinogen with unknown relevance to humans (A3)

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

96 hour(s) LC50: >5000 mg/kg (Oncorhynchus mykiss)

This material is not expected to be harmful to aquatic organisms

ENVIRONMENTAL FATE

This material is not expected to be readily biodegradable. This material is considered inherently biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: PETROLEUM LUBRICATING OIL, NOT REGULATED AS A HAZARDOUS MATERIAL FOR TRANSPORTATION UNDER 49 CFR
Additional Information: NOT HAZARDOUS BY U.S. DOT. ADR/RID HAZARD CLASS NOT APPLICABLE

IMO/IMDG Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER THE IMDG CODE

ICAO/IATA Shipping Description: PETROLEUM LUBRICATING OIL; NOT REGULATED AS DANGEROUS GOODS FOR TRANSPORT UNDER ICAO

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES: 1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED

01-1=IARC Group 1

03=EPCRA 313

01-2A=IARC Group 2A

04=CA Proposition 65

01-2B=IARC Group 2B
02=NTP Carcinogen

05=MA RTK
06=NJ RTK
07=PA RTK

No components of this material were found on the regulatory lists above

CHEMICAL INVENTORIES:

All components comply with the following chemical inventory requirements: EINECS (European Union), IECSC (China), KECI (Korea), TSCA (United States)

One or more components does not comply with the following chemical inventory requirements: AICS (Australia), DSL (Canada), ENCS (Japan), PICCS (Philippines).

NEW JERSEY RTK CLASSIFICATION:

Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A. 34:5A-1 et seq., the product is to be identified as follows: PETROLEUM OIL (Lubricating oil)

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 1 Reactivity: 0

HMIS RATINGS: Health: 1 Flammability: 1 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:

Label Category : INDUSTRIAL OIL 1 - IND1, SPRAY APPLICATIONS - SPRA

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet. 1,12,15

Revision Date: 05/09/2006

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Government Industrial Hygienists	IMO/MDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on	OSHA - Occupational Safety and Health Administration

Cancer

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

MATERIAL SAFETY DATA SHEET**Product Trade Name: K-35****Revision Date: 01-Feb-2012****1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

Product Trade Name: K-35
Synonyms: None
Chemical Family: Carbonate
Application: Additive
Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone 1-580-251-4335
e-mail fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium carbonate	497-19-8	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory irritation

4. FIRST AID MEASURES

Inhalation: If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin: Wash with soap and water. Get medical attention if irritation persists.

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 2, Flammability 0, Reactivity 0

HMS Ratings: Health 2, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment Avoid creating and breathing dust

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust

Storage Information Store away from acids Store in a cool, dry location Product has a shelf life of 24 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Localized ventilation should be used to control dust levels

Respiratory Protection Dust/mist respirator (N95, P2/P3)

Hand Protection Normal work gloves

Skin Protection Normal work coveralls

Eye Protection Dust proof goggles

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

Color: White

Odor: Odorless

pH: 11.4

9. PHYSICAL AND CHEMICAL PROPERTIES

Specific Gravity @ 20 C (Water=1):	2.5
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft ³):	53.8
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	105.99

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	May cause respiratory irritation
Skin Contact	Prolonged or repeated contact may cause skin irritation
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach
Aggravated Medical Conditions	None known
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
Other Information	None known
Toxicity Tests	
Oral Toxicity:	LD50: 4220 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not applicable
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM24 385 mg/l (Lepomis macrochirus)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	Does not apply
NJ Right-to-Know Law	Does not apply
PA Right-to-Know Law	Does not apply

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335
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Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.
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END OF MSDS

MATERIAL SAFETY DATA SHEET

Product Trade Name: LCA-1

Revision Date: 22-Jul-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LCA-1
 Synonyms: None
 Chemical Family: Organic hydrocarbon
 Application: Solvent

Manufacturer/Supplier: Halliburton Energy Services, Inc
 P O Box 1431
 Duncan, Oklahoma 73536-0431
 Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
 Telephone 1-580-251-4335
 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Paraffinic solvent		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. Combustible

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air If not breathing give artificial respiration, preferably mouth-to-mouth If breathing is difficult give oxygen Get medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and laundry before reuse

Eyes Immediately flush eyes with large amounts of water for at least 30 minutes Seek prompt medical attention.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	176
Flash Point/Range (C):	80
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	0.5
Flammability Limits in Air - Upper (%):	4.9

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 2, Reactivity 0
HMIS Ratings: Health 1, Flammability 2, Physical Hazard 0, PPE X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Remove ignition sources and work with non-sparking tools. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid breathing vapors. Avoid breathing mist. Wash hands after use. Launder contaminated clothing before reuse. Avoid contact with eyes, skin, or clothing. Ground and bond containers when transferring from one container to another.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Organic vapor respirator with a dust/mist filter.

Hand Protection Imperious rubber gloves

Skin Protection Normal work coveralls

Eye Protection

Chemical goggles, also wear a face shield if splashing hazard exists

Other Precautions

Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	0.813
Density @ 20 C (lbs./gallon):	6.68
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	392
Boiling Point/Range (C):	200
Freezing Point/Range (F):	-49
Freezing Point/Range (C):	-45
Vapor Pressure @ 20 C (mmHg):	0.3
Vapor Density (Air=1):	7.1
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	3.04
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause chemical pneumonia. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	Causes drying of the skin. May cause moderate skin irritation.
Eye Contact	May cause eye irritation.

Ingestion	Irritation of the mouth, throat, and stomach. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Skin disorders. Eye ailments. Respiratory disorders.
Chronic Effects/Carcinogenicity	The full refining history is known and it can be shown that the production substance is not carcinogen, therefore the classification as a carcinogen need not apply.
Other Information	None known
Toxicity Tests	
Oral Toxicity:	LD50 > 2000 mg/kg (Rat)
Dermal Toxicity:	LD50 > 2000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
Not restricted in accordance with the terms and conditions of 49 CFR 173 120(b)(3)

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely
Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical
Release Reporting" under Section 313 (40 CFR 372).

EPA CERCLA/Superfund
Reportable Spill Quantity Not applicable.

EPA RCRA Hazardous Waste
Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as
defined by the US EPA

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law Does not apply.

NJ Right-to-Know Law Does not apply

PA Right-to-Know Law Does not apply

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

WHMIS Hazard Class B3 Combustible Liquids
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

MATERIAL SAFETY DATA SHEET

Product Trade Name: LGC-36 UC

Revision Date: 14-Feb-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LGC-36 UC
Synonyms: None
Chemical Family: Blend
Application: Liquid Gel Concentrate

Manufacturer/Supplier Halliburton Energy Services, Inc
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By Chemical Compliance
Telephone 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	30 - 60%	Not applicable	Not applicable
Guar gum	9000-30-0	30 - 60%	10 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation May cause headache, dizziness, and other central nervous system effects May cause allergic respiratory reaction. May be harmful if swallowed

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air If not breathing give artificial respiration, preferably mouth-to-mouth If breathing is difficult give oxygen Get medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes Get medical attention Remove contaminated clothing and launder before reuse

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists

Ingestion Do not induce vomiting Slowly dilute with 1-2 glasses of water or milk and seek medical attention Never give anything by mouth to an unconscious person

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	180
Flash Point/Range (C):	82
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Carbon Dioxide, Dry Chemicals, Foam
Special Exposure Hazards	Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 2, Reactivity 0
HMIS Ratings:	Health 1, Flammability 2, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Organic vapor respirator with a dust/mist filter (A2P2/P3)

Hand Protection Impervious rubber gloves

Skin Protection Normal work coveralls

Eye Protection Chemical goggles, also wear a face shield if splashing hazard exists

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Off white
Odor:	Mild hydrocarbon
pH:	6.5 - 7.5
Specific Gravity @ 20 C (Water=1):	1.086
Density @ 20 C (lbs./gallon):	9.05
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	392
Boiling Point/Range (C):	200
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	< 0.15
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame
Incompatibility (Materials to Avoid)	Strong oxidizers
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause allergic respiratory reaction. May cause chemical pneumonia. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation. Causes drying of the skin.
Eye Contact	May cause eye irritation.

Ingestion	Irritation of the mouth, throat, and stomach. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Skin disorders
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
Other Information	None known
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
Not restricted in accordance with the terms and conditions of 49 CFR 173 120(b)(3)

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65 The California Proposition 65 regulations apply to this product

MA Right-to-Know Law One or more components listed

NJ Right-to-Know Law One or more components listed

PA Right-to-Know Law One or more components listed

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SSA-2**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SSA-2
Synonyms: None
Chemical Family: Sand
Application: Proppant

Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye and respiratory irritation

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water

Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media None - does not burn

Special Exposure Hazards Not applicable

Special Protective Equipment for Fire-Fighters Not applicable

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known

Procedure for Cleaning / Absorption Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Material is slippery when wet.

Storage Information Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection	Normal work gloves
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft³):	95.2
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	60.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known
Incompatibility (Materials to Avoid)	Hydrofluoric acid
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C)
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
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Inhalation	<p>Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A)</p> <p>Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below)</p>
Skin Contact	None known
Eye Contact	May cause mechanical irritation to eye
Ingestion	None known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust
Chronic Effects/Carcinogenicity	<p>Silicosis Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.</p> <p>Cancer Status The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).</p> <p>There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.</p>
Other Information	For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997)
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997)

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations

Contaminated Packaging Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SAND - WHITE**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SAND - WHITE
Synonyms: None
Chemical Family: Sand
Application: Proppant

Manufacturer/Supplier Halliburton Energy Services
 P O Box 1431
 Duncan, Oklahoma 73536-0431
 Emergency Telephone (281) 575-5000

Prepared By Chemical Compliance
 Telephone 1-580-251-4335
 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
 May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
 Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water

Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media None - does not burn

Special Exposure Hazards Not applicable

Special Protective Equipment for Fire-Fighters Not applicable

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment Avoid creating and breathing dust

Environmental Precautionary Measures None known

Procedure for Cleaning / Absorption Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal

7. HANDLING AND STORAGE

Handling Precautions This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud Avoid breathing dust. Avoid creating dusty conditions Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Material is slippery when wet

Storage Information Store in a cool, dry location Use good housekeeping in storage and work areas to prevent accumulation of dust Close container when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2

Respiratory Protection Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection	Normal work gloves
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure
Other Precautions	None known

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	2.65
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	100
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	65

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known
Incompatibility (Materials to Avoid)	Hydrofluoric acid
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C)
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
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Inhalation	<p>Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A)</p> <p>Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below)</p>
Skin Contact	None known
Eye Contact	May cause mechanical irritation to eye
Ingestion	None known
Aggravated Medical Conditions	Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust
Chronic Effects/Carcinogenicity	<p>Silicosis Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.</p> <p>Cancer Status The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).</p> <p>There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.</p>
Other Information	For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997)
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Refer to <u>IARC Monograph 68, Silica, Some Silicates and Organic Fibres</u> (June 1997)

Genotoxicity: Not determined

**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: Sand, API Recycled, 20/40 Mesh

Revision Date: 17-Jan-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: Sand, API Recycled, 20/40 Mesh

Synonyms: None

Chemical Family: Sand

Application: Proppant

Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, quartz	14808-60-7	60 - 100%	TWA 0.025 mg/m ³	10 mg/m ³ %SiO ₂ + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD

May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation

If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Sand, API Recycled, 20/40 Mesh
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HESI00407

Skin	Wash with soap and water
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists
Ingestion	Under normal conditions, first aid procedures are not required
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media None - does not burn.

Special Exposure Hazards Not applicable

Special Protective Equipment for Fire-Fighters Not applicable

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known

Procedure for Cleaning / Absorption Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal

7. HANDLING AND STORAGE

Handling Precautions This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.

Storage Information Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Product has a shelf life of 36 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149 (FFP2/FFP3), or equivalent respirator when using this product
Hand Protection	Normal work gloves
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure
Other Precautions	None known

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Not determined
Color:	Not determined
Odor:	Not determined
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Not Determined
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known
Incompatibility (Materials to Avoid)	Hydrofluoric acid
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C)
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation

Symptoms related to exposure

Acute Toxicity

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1) There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A)

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below)

Eye Contact

May cause mechanical irritation to eye

Skin Contact

None known

Ingestion

None known

Chronic Effects/Carcinogenicity

Silicosis Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function This disease is exacerbated by smoking Individuals with silicosis are predisposed to develop tuberculosis

Cancer Status The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans) Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen" Refer to the 9th Report on Carcinogens (2000) The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2)

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Crystalline silica, quartz	14808-60-7	500 mg/kg (Rat)	No data available	No data available

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity: Not determined

Acute Crustaceans Toxicity: Not determined

Acute Algae Toxicity: Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
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Crystalline silica, quartz	14808-60-7	No information available	No information available	No information available	No information available
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12.2 Persistence and degradability

No information available

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations

Contaminated Packaging Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR

Not restricted

Air Transportation

ICAO/IATA

Not restricted

Sea Transportation

IMDG

Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	The California Proposition 65 regulations apply to this product
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed.
Canadian Regulations	
Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: SP BREAKER

Revision Date: 10-Mar-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SP BREAKER

Synonyms: None

Chemical Family: Oxidant

Application: Breaker

Manufacturer/Supplier Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone. (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium persulfate	7775-27-1	60 - 100%	0.1 mg/m ³	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause allergic skin and respiratory reaction May cause eye irritation Oxidizer

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water Get medical attention if irritation persists

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists

Ingestion Do not induce vomiting Slowly dilute with 1-2 glasses of water or milk and seek medical attention Never give anything by mouth to an unconscious person

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Oxidizer May ignite combustibles Decomposition in fire may produce toxic gases

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 1, Flammability 0, Reactivity 1

HMS Ratings: Health 1, Flammability 0, Physical Hazard 1 , PPE F

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid dust accumulations

Storage Information Store away from combustibles Store in a cool well ventilated area. Keep container closed when not in use Product has a shelf life of 12 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Localized ventilation should be used to control dust levels

Respiratory Protection Dust/mist respirator (N95, P2/P3)

Hand Protection Butyl rubber gloves.

Skin Protection Rubber apron

Eye Protection Dust proof goggles.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White
Odor:	Odorless
pH:	6
Specific Gravity @ 20 C (Water=1):	2.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	84.3
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	35
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	238.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Avoid contact with readily oxidizable materials
Incompatibility (Materials to Avoid)	Avoid halogens Contact with acids Strong alkalis Combustible materials
Hazardous Decomposition Products	Oxides of sulfur. Oxygen Sulfuric acid
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation

Symptoms related to exposure

Acute Toxicity

Inhalation	May cause allergic respiratory reaction
Eye Contact	May cause eye irritation
Skin Contact	May cause an allergic skin reaction
Ingestion	Irritation of the mouth, throat, and stomach

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
------------	------------	-----------	-------------	-----------------

Sodium persulfate	7775-27-1	895 mg/kg (Rat) 1200 mg/kg 930 mg/kg 1000 mg/kg 920 mg/kg	> 10000 mg/kg (Rat)	190 mg/L (Rat) 4h
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12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Sodium persulfate	7775-27-1	EC50(72h) 116 mg/L (biomass) (Pseudokirchnerella subcapitata)	LC50(96h) 163 mg/L (Oncorhynchus mykiss)	EC10(18h) 36 mg/L (Pseudomonas putida)	EC50(48h) 133 mg/L (mobility) (Daphnia magna)

12.2 Persistence and degradability

The methods for determining biodegradability are not applicable to inorganic substances

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations
Bury in a licensed landfill according to federal, state, and local regulations
Substance should NOT be deposited into a sewage facility

Contaminated Packaging

This bag may contain residue of a hazardous material. Some authorities may regulate such containers as hazardous waste. Dispose of container according to national or local regulations. Contaminated packaging may be disposed of by rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1505, Sodium Persulfate, 5.1, III
NAERG 140

Canadian TDG
Sodium Persulfate , 5 1 , UN1505 , III

ADR

UN1505, Sodium Persulfate , 5 1 , III

Air Transportation

ICAO/IATA

UN1505, Sodium Persulfate , 5 1 , III

Sea Transportation

IMDG

UN1505, Sodium Persulfate , 5 1 , III
EmS F-A, S-Q

Other Transportation Information

Labels: Oxidizer

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
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EPA SARA Title III Extremely Hazardous Substances	Not applicable
--	----------------

EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
--	------------------------------------

EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
---------------------------------	--

EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
---	----------------

EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001
--	---

California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
----------------------------------	---

MA Right-to-Know Law	One or more components listed
-----------------------------	-------------------------------

NJ Right-to-Know Law	One or more components listed.
-----------------------------	--------------------------------

PA Right-to-Know Law

One or more components listed

Canadian Regulations**Canadian DSL Inventory**

All components listed on inventory or are exempt

WHMIS Hazard Class

C Oxidizing Materials
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS

Not applicable

Additional information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WG-36 GELLING AGENT**

Revision Date: 07-Oct-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WG-36 GELLING AGENT

Synonyms: None

Chemical Family: Polysaccharide

Application: Gelling Agent

Manufacturer/Supplier Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause mild eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined Min: > 200
Flash Point/Range (C):	Not Determined Min: > 93
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases Organic dust in the presence of an ignition source can be explosive in high concentrations Good housekeeping practices are required to minimize this potential

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from oxidizers Store in a cool, dry location Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended
Dust/mist respirator (N95, P2/P3)

Hand Protection Normal work gloves

Skin Protection Normal work coveralls

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known

9. PHYSICAL AND CHEMICAL PROPERTIES

WG-36 GELLING AGENT
Page 2 of 6

HESI00420

Physical State:	Solid
Color:	Off white
Odor:	Bean
pH:	6.5-7.5
Specific Gravity @ 20 C (Water=1):	1.42 - 1.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
-----------------------------	---------------------------------

Symptoms related to exposure

Acute Toxicity

Inhalation	May cause respiratory irritation May cause allergic respiratory reaction
Eye Contact	May cause eye irritation
Skin Contact	None known
Ingestion	None known

Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
---------------------------------	---

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation

Contains no hazardous substances	Mixture	No data available	No data available	No data available
----------------------------------	---------	-------------------	-------------------	-------------------

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Contains no hazardous substances	Mixture	No information available	No information available	No information available	No information available

12.2 Persistence and degradability

Readily biodegradable

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations

Contaminated Packaging Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR

Not restricted

Air Transportation

ICAO/IATA

Not restricted

Sea Transportation

IMDG

Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	Does not apply
NJ Right-to-Know Law	Does not apply
PA Right-to-Know Law	Does not apply

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

100% Recycled



30% PCW



Pat Haddon - I was in the TCC when someone called out fire on location. I called out to Neutral all pumps. I proceeded to go down to the fire pond, then walked to the front of location for roll call.

Brian Brightbill 571402 - I was in the tool trailer when someone keyed up that there was a fire. I ran to a truck and blew the horn then proceeded to evacuate.

James Hill (502114) - I was in the TCC when fire was called, and looked out the window and saw the fire. We sounded the evac horn and left location.

Chad McLaughlin - I was calling the wireline run when my blender tender called out that the "blender's on fire!" I informed wireline that we were neutralizing pumps and evacuating location at which time we hit the e-stop on the TCC and evacuated off the backside of location.

Brian Myers 496211

5724-858-6014

I was in the concx when they called fire on the Radio when I came out they were evacuating location.

Andrew Stroud - 509924 E-Tech

I was repairing cables at my truck, I heard the call for fire on the blender over the radio and I evacuated location.

Sean Snyder (568895)

I was loading sand, I heard someone on the radio say the blender was on fire. I looked to see the fire and headed for the front gate.

Peter Morgan (568890)

I was working in the sand area and when I heard the fire alert on the radio, I asked the sand driver to evacuate and ran out with him.

Nick MBOUNGOU (445306)

I was inside of the pump truck cleaning a PPE (Respirator, Face shield) and hear on the radio (talkie) that there was a fire on location.

KOJO SIFAH

Walking around the TCC I heard over the radio from the blender tender that the blender is on fire. I went over to the blender and saw flames up in the air. A one long horn blast was sounded and everyone was accounted for in the primary muster areas.

Chris Painter

Was in Parts Trailer cleaning up when someone said there was a fire on the Radio. Was told to go to the Muster Area from there. Headed straight to Muster Area.

Philip Burns

was in Conner cleaning when Fire Fire came across Radio. Then I went to a truck and blew the air horn and proceeded to the front gate for a head count.

Andrew Raymond

I was by the TCC when blender fire was called. I saw fuelers and had them move their truck from inside bank to out bank as far as they could go. Then I evacuated and got to muster areas.



$\mu_{\text{max}} = 0.7 \text{ h}^{-1}$, $K_s = 0.08 \text{ g l}^{-1}$



K





100% Recycled 30% PCW



From: Rollins, Kelly <Kelly.Rollins@dnr.state.oh.us>
Sent: Monday, August 18, 2014 1:04 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Subject: FW: Chemicals
Attach: Chemical 1.pdf, Chemical 2.pdf

Mr. Root,

Attached are the MSDS as requested.
The Ohio Revised Code Chief Simmers referred to is

1509.10

Please let me know if you have any questions.
Thank you.

Kelly M. Rollins

Assistant to Chief Simmers
Ohio Department of Natural Resources
Oil and Gas Resources Management
2045 Morse Road, Bldg. F-2
Columbus, OH 43229
(614) 265-6608

NON-RESPONSIVE



• NON-RESPONSIVE

HESI00433

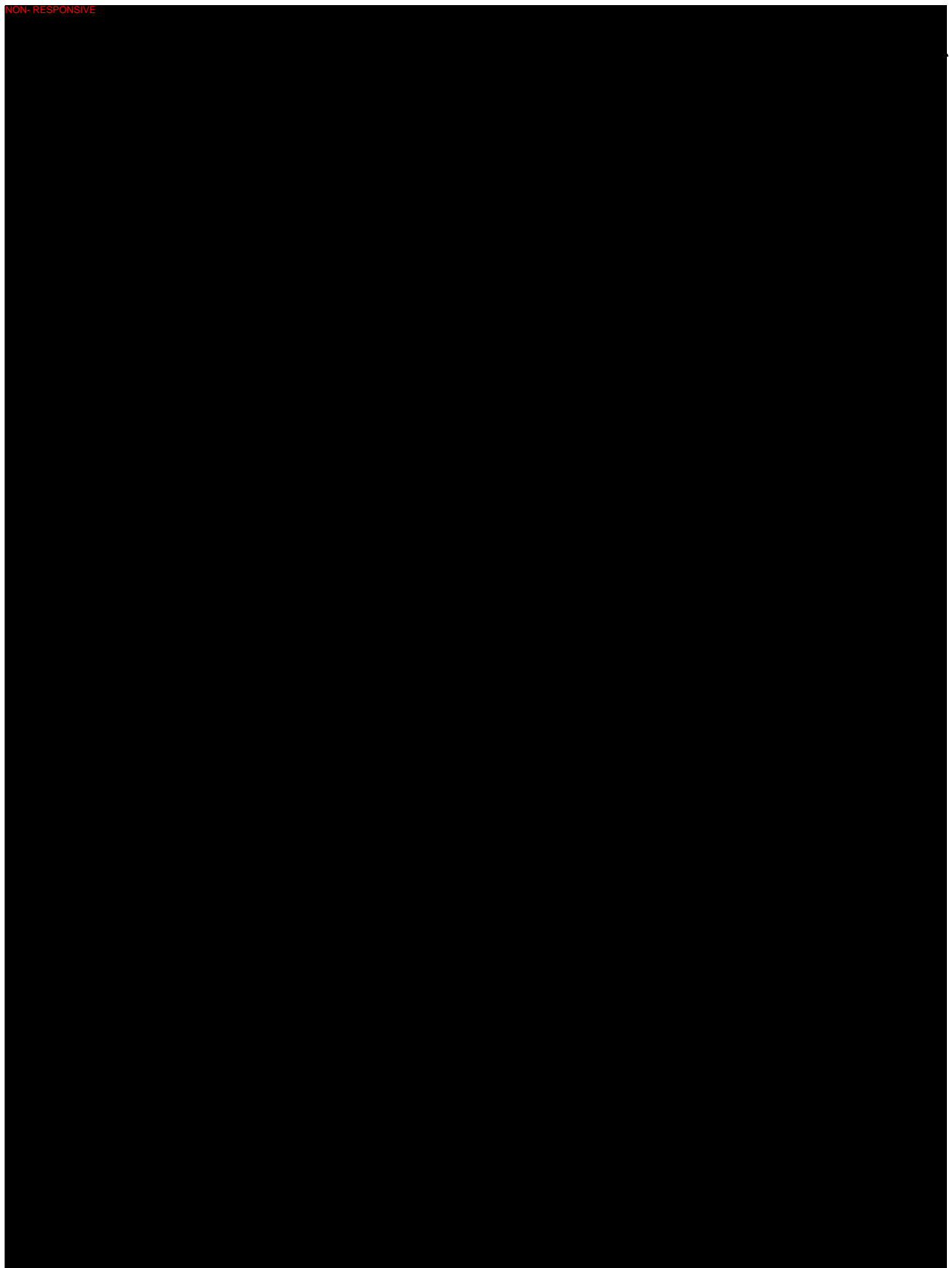
HALLIBURTON

NON-RESPONSIVE



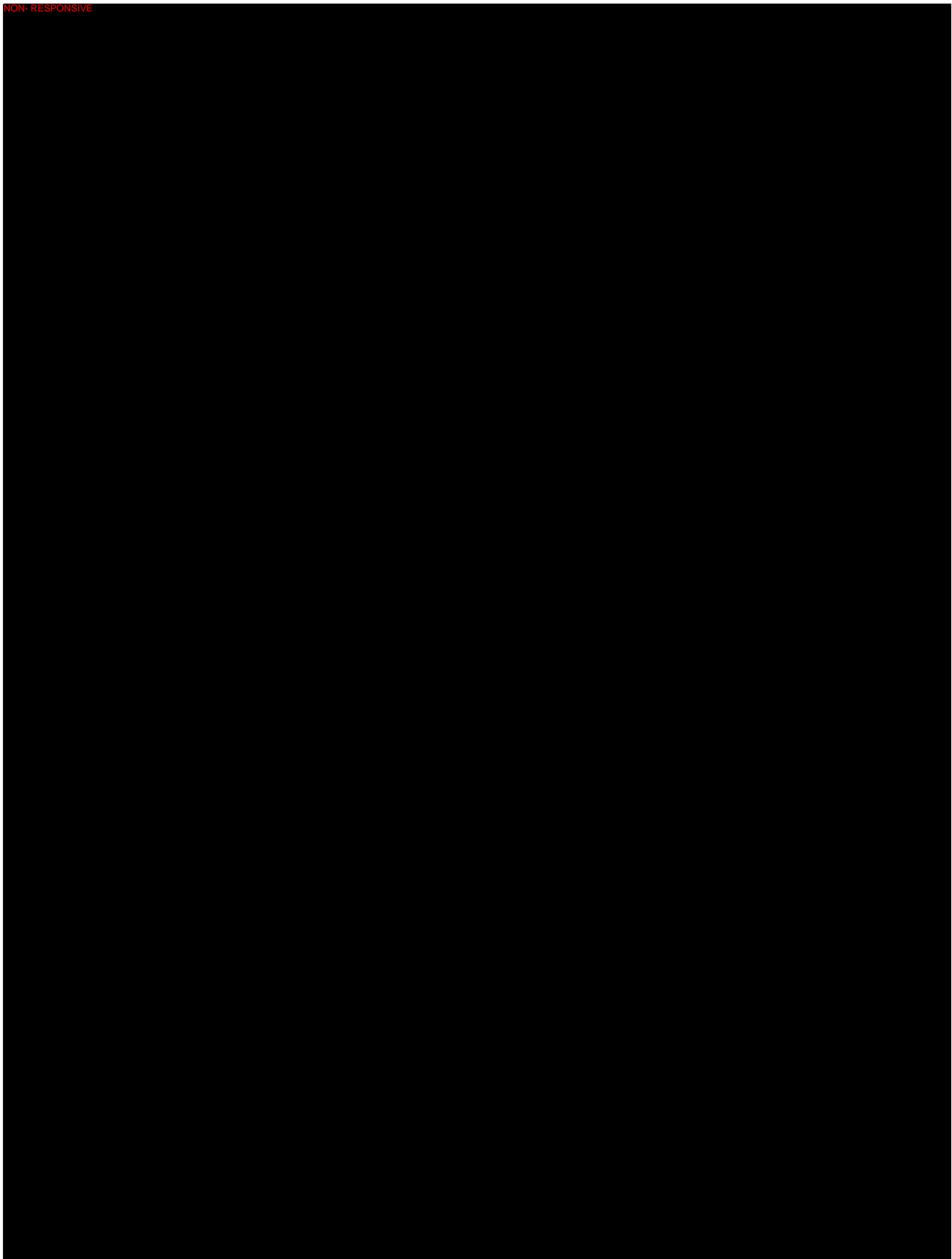
HESI00436

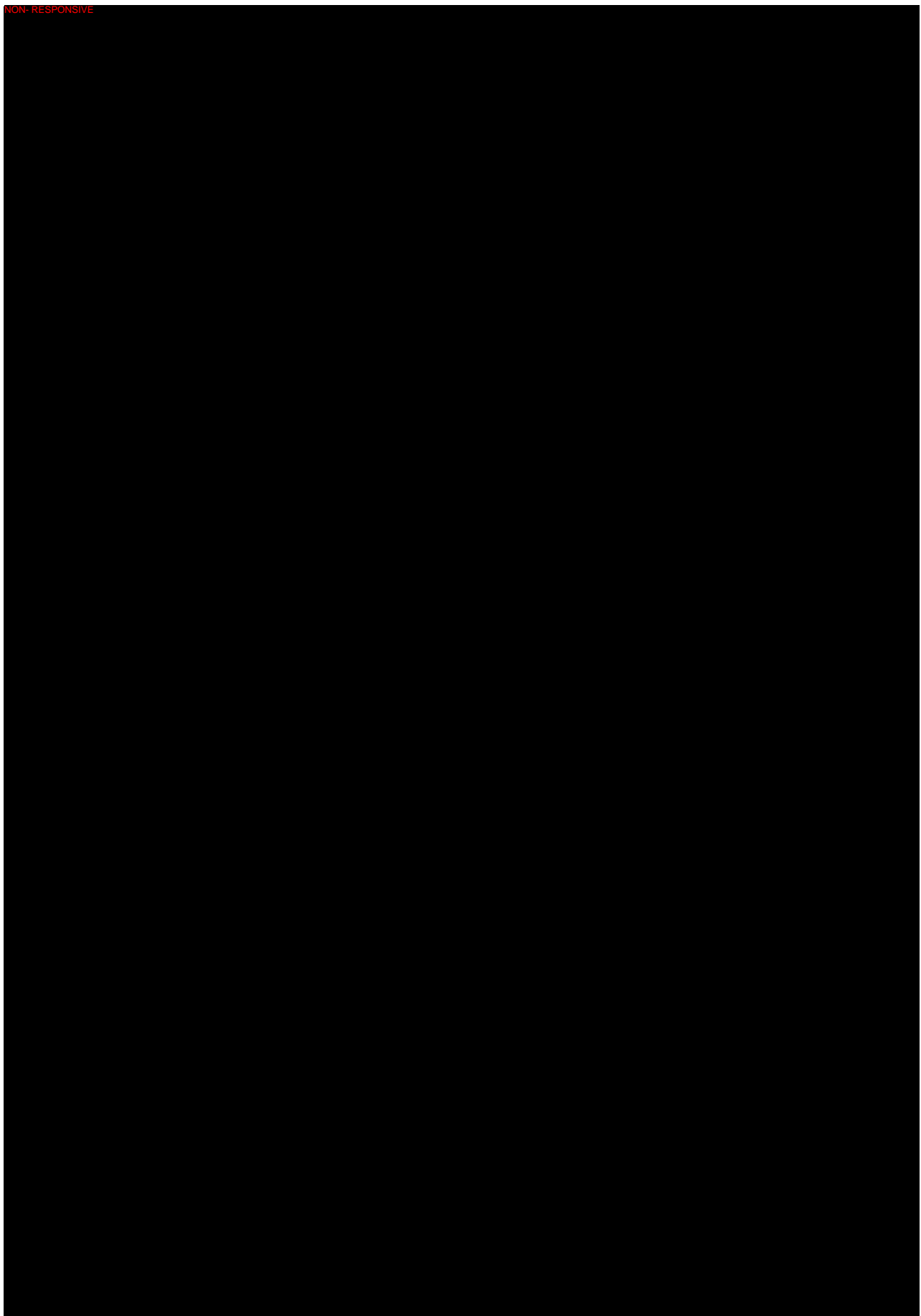
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M



80000 SERIES
30% PCW

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, PA 15222-3142
Phone: 412 667 6000
Fax: 412 667 6050
www.mcguirewoods.com

Leonard J. Marsico
Direct: 412 667 7987

McGUIREWOODS

lmarsico@mcguirewoods.com
Direct Fax: 412 667.7956

August 22, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Jerry G. Schulte

jschulte@orsanco.org

Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Avenue
Cincinnati, OH 45230

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

I write as counsel to Halliburton Company and to confirm the detailed message I left you this morning.

We just learned that the Ohio EPA disclosed to you the formulation of Halliburton's proprietary product GasPerm 1000 in connection with the June 28 fire at the Eisenbarth Pad in Monroe County.

We write to confirm that you and ORSANCO understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosure of it to ORSANCO was also in confidence. The Ohio EPA is currently in the process of confirming the trade secret status of this formulation.

In light of the foregoing, we ask that ORSANCO confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter and that you provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

As I requested in my voicemail, please call me at 412.973.8982 when you receive this message so that we can discuss it further.

Atlanta | Austin | Baltimore | Brussels | Charlotte | Charlottesville | Chicago | Dallas | Houston | Jacksonville | London
Los Angeles | New York | Norfolk | Pittsburgh | Raleigh | Richmond | Tysons Corner | Washington, D.C. | Wilmington

HESI00442

August 22, 2014
Page 2

We greatly appreciate your and ORSANCO's prompt attention to this very important matter.

Very truly yours,



Leonard J. Marsico
McGuireWoods LLP

LJM/jab

cc: Ann Fischbein (by e-mail at Ann.Fischbein@epa.ohio.gov)
Cynthia Hafner (by e-mail at Cynthia.Hafner@epa.ohio.gov)
John Crist (by e-mail at John.Crist@epa.ohio.gov)

THE FOREGOING IS CONFIRMED:

ORSANCO

By: _____

Its: _____
Print Name

Date: _____

HESI00443

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Thursday, July 17, 2014 10:42 AM
To: john.crist@epa.ohio.gov
Subject: FW: GasPerm 1000 Trade Secret request
Attach: tradesecretsubstantiation2.docx

From: Hafner, Cynthia [mailto:Cynthia.Hafner@epa.ohio.gov]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

HESI00444



State of Ohio Environmental Protection Agency

Trade Secret Request Form

***Please note that Ohio Administrative Code OAC 3745-49-03(A) (attached) makes it clear that the burden of establishing entitlement to trade secret protection is upon the party requesting that protection.**

1. In order to assert a trade secret claim regarding a submission of documents, you shall, at the time of the submission of documents, submit the following to the Director
 - (a) An unredacted copy of the documents submitted, identified as such, with each page numbered consecutively from beginning to end,
 - (b) A proposed public copy of the documents submitted, identified as such, with each page numbered consecutively from beginning to end,
 - (c) With respect to each item of information claimed to be a trade secret, a statement that describes each item and that identifies the location of each item;
 - (d) A sworn or affirmed signature on this request form, indicating that the statements made in this form are true and accurate

"Trade secrets" are defined in Ohio Revised Code Section (R.C.) 1333.61(D) to mean "information, including the whole or any portion or phase of any scientific or technical information, design, process, procedure, formula, pattern, compilation, program, device, method, technique, or improvement, or any business information or plans, financial information, or listing of names, addresses, or telephone numbers, that satisfies both of the following.

- (1) It derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use
- (2) It is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

- 2 For each item you assert to be a trade secret, explain with sufficient detail, and with reference to the specific page number, the following
- a The nature of the information that you are seeking protection (i.e. scientific or technical information, design, process, procedure, formula, pattern, compilation, program, device, method, technique, or improvement, or any business information or plans, financial information, or listing of names, addresses, or telephone number),
 - b How the information derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by other persons who can obtain economic value from its disclosure or use
 - c The efforts to maintain its secrecy and an attestation that the information is not, in fact, generally known outside of your organization or otherwise discoverable in other public documentation

From: Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Sent: Friday, July 25, 2014 3:03 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Subject: FW: RE: GasPerm 1000 Trade Secret request
Attach: Public SDS for Gas Perm 1000.pdf

From: Dawn Robertson [mailto:Dawn.Robertson@halliburton.com]
Sent: Friday, July 25, 2014 2:33 PM
To: Hafner, Cynthia; Fischbein, Ann
Cc: tkantorczyk@mankogold.com; Stuart Kemp; Denise Tuck
Subject: RE: RE: GasPerm 1000 Trade Secret request

Ann,
As requested, I have attached the MSDS omitted in our previous submission.
Kind Regards,
Dawn Robertson
Global HSE Chemical Compliance Manager
Halliburton Energy Services, Inc.
10200 Bellaire Blvd
Houston, TX. 77072
dawn.robertson@halliburton.com
(281) 575 - 4188 (Oak Park Office)
(832) 205-2330 (Cell)
(713) 446-7385 (Alternate Cell)

From: Dawn Robertson
Sent: Monday, July 21, 2014 7:39 AM
To: 'Hafner, Cynthia'; Fischbein, Ann
Cc: 'tkantorczyk@mankogold.com'; Stuart Kemp; Denise Tuck
Subject: RE: GasPerm 1000 Trade Secret request

Ms. Hafner,
This correspondence is in response to your request from July 8, 2014, regarding verification of our Gas Perm 1000 trade secret claim. Attached please find our signed and certified substantiation letter.

You may contact Mr. Kemp or myself if you have any additional questions or concerns.

Sincerely,
Dawn Robertson
Global HSE Chemical Compliance Manager
Halliburton Energy Services, Inc.
10200 Bellaire Blvd.
Houston, TX. 77072
dawn.robertson@halliburton.com
(281) 575 - 4188 (Oak Park Office)
(832) 205-2330 (Cell)
(713) 446-7385 (Alternate Cell)

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HALLIBURTON

NON-RESPONSIVE



NON-RESPONSIVE

NON-RESPONSIVE

From: Robbins, Bonnie B <brobbs@mcguirewoods.com>
Sent: Friday, August 22, 2014 4:59 PM
To: jschulte@orsanco.org
Cc: ann.fischbein@epa.ohio.gov, cynthia.hafner@epa.ohio.gov, john.crst@epa.ohio.gov, Marsico, Leonard J <LMarsico@mcguirewoods.com>
Subject: Halliburton GasPerm 1000 Trade Secret Notification
Attach: Active_59733451_1_8_22_14 Letter to Jerry G Schulte PDF

Dear Mr. Schulte

Please see the letter from counsel for Halliburton Company. A hard copy will follow by overnight mail.

Bonnie Robbins

Bonnie B. Robbins

Legal Secretary to Ronald W. Crouch, Brad A. Funari, Laura A. Lange, Jamie A. Edwards and Melissa S. Liskov

McGuireWoods LLP

625 Liberty Avenue, 23rd Floor

Pittsburgh, Pennsylvania 15222

412 667 6047 (Direct Line)

412 667 6050 or 412 667 6096 (FAX)

brobbs@mcguirewoods.com

www.mcguirewoods.com

This e-mail may contain confidential or privileged information. If you are not the intended recipient, please advise by return e-mail and delete immediately without reading or forwarding to others.

HESI00456

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, PA 15222-3142
Phone 412 667 6000
Fax 412 667 6050
www.mcguirewoods.com

Leonard J. Marsico
Direct 412 667 7987

McGUIREWOODS

lmarsico@mcguirewoods.com
Direct Fax 412.667.7956

August 22, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Jerry G. Schulte
jschulte@orsanco.org
Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Avenue
Cincinnati, OH 45230

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

I write as counsel to Halliburton Company and to confirm the detailed message I left you this morning.

We just learned that the Ohio EPA disclosed to you the formulation of Halliburton's proprietary product GasPerm 1000 in connection with the June 28 fire at the Eisenbarth Pad in Monroe County.

We write to confirm that you and ORSANCO understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosure of it to ORSANCO was also in confidence. The Ohio EPA is currently in the process of confirming the trade secret status of this formulation.

In light of the foregoing, we ask that ORSANCO confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter and that you provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

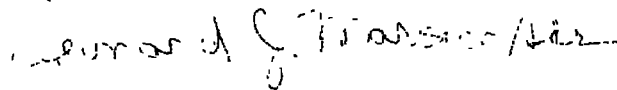
As I requested in my voicemail, please call me at 412.973.8982 when you receive this message so that we can discuss it further.

Atlanta | Austin | Baltimore | Brussels | Charlotte | Charlottesville | Chicago | Dallas | Houston | Jacksonville | London
Los Angeles | New York | Norfolk | Pittsburgh | Raleigh | Richmond | Tysons Corner | Washington, D.C. | Wilmington

HESI00457

We greatly appreciate your and ORSANCO's prompt attention to this very important matter.

Very truly yours,



Leonard J. Marsico
McGuireWoods LLP

LJM/jab

cc: Ann Fischbein (by e-mail at Ann.Fischbein@epa.ohio.gov)
Cynthia Hafner (by e-mail at Cynthia.Hafner@epa.ohio.gov)
John Crist (by e-mail at John.Crist@epa.ohio.gov)

THE FOREGOING IS CONFIRMED:

ORSANCO

By: _____

Its: _____
Print Name

Date: _____

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 10:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

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From: Dawn Robertson
Sent: Tuesday, July 15, 2014 3:51 PM
To: Fischbein, Ann
Cc: Stuart Kemp
Subject: RE: Ohio EPA Trade Secret Response letter

Ann,
Thank you for your call today. As a follow up to our conversation today, I would like to introduce Stuart Kemp. Stuart is the legal contact regarding this matter. His contact information is provided below. Please feel free to contact him regarding this matter.

Stuart H. Kemp
Sr. Director, HSE Law Practice Group
Halliburton Energy Services, Inc.
delivery 2107 CityWest Boulevard, Building 2
Houston, Texas 77042-3051
mail P O Box 42806
Houston, TX 77242-2806
office 713/839-4539
mobile 281/660-0072
fax 713/839-4561

We are diligently working on your request, and should have our response to you very soon.

Kind Regards,
Dawn Robertson
Global HSE Chemical Compliance Manager
Halliburton Energy Services, Inc.
10200 Bellaire Blvd.
Houston, TX. 77072
dawn.robertson@halliburton.com
(281) 575 - 4188 (Oak Park Office)
(832) 205-2330 (Cell)
(713) 446-7385 (Alternate Cell)

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HESI00460



From: Dawn Robertson
Sent: Friday, July 25, 2014 1:36 PM
To: 'Fischbein, Ann'
Subject: RE: RE: GasPerm 1000 Trade Secret request

Yes, this is the public version.

From: Fischbein, Ann [<mailto:Ann.Fischbein@epa.ohio.gov>]
Sent: Friday, July 25, 2014 1:35 PM
To: Dawn Robertson; Hafner, Cynthia
Cc: tkantorczyk@mankogold.com; Stuart Kemp; Denise Tuck
Subject: RE: RE: GasPerm 1000 Trade Secret request

Dawn,

Thank you for this. Just to put a finer point on it, this is the MSDS which you are indicating is public, correct? I appreciate your quick response.

Ann

From: Dawn Robertson [<mailto:Dawn.Robertson@halliburton.com>]
Sent: Friday, July 25, 2014 2:33 PM
To: Hafner, Cynthia; Fischbein, Ann
Cc: tkantorczyk@mankogold.com; Stuart Kemp; Denise Tuck
Subject: RE: RE: GasPerm 1000 Trade Secret request

Ann,

As requested, I have attached the MSDS omitted in our previous submission.

Kind Regards,

Dawn Robertson

Global HSE Chemical Compliance Manager

Halliburton Energy Services, Inc.

10200 Bellaire Blvd.

Houston, TX. 77072

dawn.robertson@halliburton.com

(281) 575 - 4188 (Oak Park Office)

(832) 205-2330 (Cell)

(713) 446-7385 (Alternate Cell)

From: Dawn Robertson
Sent: Monday, July 21, 2014 7:39 AM
To: 'Hafner, Cynthia'; Fischbein, Ann
Cc: tkantorczyk@mankogold.com; Stuart Kemp; Denise Tuck
Subject: RE: GasPerm 1000 Trade Secret request

Ms. Hafner,

This correspondence is in response to your request from July 8, 2014, regarding verification of our Gas Perm 1000 trade secret claim. Attached please find our signed and certified substantiation letter.

You may contact Mr. Kemp or myself if you have any additional questions or concerns.

Sincerely,

HESI00461

Dawn Robertson
Global HSE Chemical Compliance Manager
Halliburton Energy Services, Inc.
10200 Bellaire Blvd.
Houston, TX. 77072
dawn.robertson@halliburton.com
(281) 575 - 4188 (Oak Park Office)
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From: Fischbein, Ann [<mailto:Ann.Fischbein@epa.ohio.gov>]
Sent: Friday, July 25, 2014 11:41 AM
To: Dawn Robertson
Subject: RE: GasPerm 1000 Trade Secret request

This is just a friendly reminder to send the MSDS attachment that you meant to attach to the trade secret request, since the original submission did not include it. Thank you,
Ann

From: Dawn Robertson [<mailto:Dawn.Robertson@halliburton.com>]
Sent: Monday, July 21, 2014 8:39 AM
To: Hafner, Cynthia; Fischbein, Ann
Cc: tkantorczyk@mankogold.com; Stuart Kemp; Denise Tuck
Subject: RE: GasPerm 1000 Trade Secret request

Ms. Hafner,

This correspondence is in response to your request from July 8, 2014, regarding verification of our Gas Perm 1000 trade secret claim. Attached please find our signed and certified substantiation letter.

You may contact Mr. Kemp or myself if you have any additional questions or concerns.

Sincerely,
Dawn Robertson
Global HSE Chemical Compliance Manager
Halliburton Energy Services, Inc.
10200 Bellaire Blvd.
Houston, TX. 77072
dawn.robertson@halliburton.com
(281) 575 - 4188 (Oak Park Office)
(832) 205-2330 (Cell)
(713) 446-7385 (Alternate Cell)

From: Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Sent: Wednesday, August 20, 2014 4:33 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Cc: Hafner, Cynthia <Cynthia.Hafner@epa.ohio.gov>, Crist, John <John.Crist@epa.ohio.gov>
Subject: ORSANCO Contact

Hi Brian,

Below is the ORSANCO contact I was referring to in our call today.

Jerry G. Schulte

Manager, Source Water Protection and Emergency Response

Ohio River Valley Water Sanitation Commission, ORSANCO

5735 Kellogg Ave.

Cincinnati, Ohio 45230

www.orsanco.org

www.facebook.com/ORSANCO

Office: 513.231.7719 ext 104

Mobile: 513.260.8249

I have a call in to Mike Sherron to see if he can identify any water systems for you to contact.

Have a great vacation!

Ann

HESI00464

From: Crist, John <John.Crist@epa.ohio.gov>
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

Good talking to you this morning. I wanted to make sure that we're on the same page with respect to what you are looking for. Essentially, your client (Halliburton) is planning to submit a formal trade secret request and you want to make sure you understand the process required to do so.

In response to your phone call, Cindy Hafner forwarded you the summary document which described the process that we are looking for, but I wanted to see if you had any specific questions regarding it, or if you wanted to ensure that the process is captured in the steps listed in that document (or something else entirely).

Thanks and I apologize about any redundancy here. Just want to make sure we're on the same page.

Talk to you soon.

—
John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [mailto:Cynthia.Hafner@epa.ohio.gov]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049

HESI00465

614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

From: Crist, John <John.Crist@epa.ohio.gov>
Sent: Thursday, July 17, 2014 2:00 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>, Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

Thanks. That document was not created for Halliburton – it's one the Ohio EPA sends out to assist a company in making a trade secret request. I'm following up to see if it's available on the website somewhere, and will let you know when I find out. In the meantime, please let me know if I can be of any additional help. Thank you.

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 1:39 PM
To: Crist, John
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

John,

Thank you for quickly getting back to me. My question relates to the origin of the form that Cindy Hafner sent to Halliburton. For instance, is that a form that the Ohio EPA typically sends to a company that has submitted trade secret information or was that form specifically created for Halliburton? I could not find this form on the Ohio EPA's website.

Thanks,
Brian

From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

Good talking to you this morning. I wanted to make sure that we're on the same page with respect to what you are looking for. Essentially, your client (Halliburton) is planning to submit a formal trade secret request and you want to make sure you understand the process required to do so.

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Thanks and I apologize about any redundancy here. Just want to make sure we're on the same page.

Talk to you soon.

--
John Crist
john.crist@epa.ohio.gov
(614) 644-2844

HESI00467

From: Root, Brian C. [<mailto:BRoot@mcquirewoods.com>]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Thursday, July 17, 2014 1:39 PM
To: Crist, John <John.Crist@epa.ohio.gov>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

John,

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Thanks,
Brian

From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

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In response to your phone call, Cindy Hafner forwarded you the summary document which described the process that we are looking for, but I wanted to see if you had any specific questions regarding it, or if you wanted to ensure that the process is captured in the steps listed in that document (or something else entirely).

Thanks and I apologize about any redundancy here. Just want to make sure we're on the same page.

Talk to you soon.

--
John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [mailto:Cynthia.Hafner@epa.ohio.gov]
Sent: Tuesday, July 08, 2014 11:51 AM

HESI00469

To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

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Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

HESI00470

From: Crist, John <John.Crist@epa.ohio.gov>
Sent: Thursday, July 17, 2014 2:56 PM
To: Root, Brian C. <BRoot@mcguirewoods.com>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>, Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

Hey Brian,

I did some digging and I don't believe that the document is on the webpage. It's essentially just a reiteration of what's in OAC 3745-49-03 and designed to assist companies in making trade secret requests.

—
John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 1:59 PM
To: Crist, John
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

John,

I just realized my contact information was not sent in my previous email. Here it is:

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667.7959 (FAX)

broot@mcguirewoods.com

www.mcguirewoods.com

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From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

Good talking to you this morning. I wanted to make sure that we're on the same page with respect to what you are looking for. Essentially, your client (Halliburton) is planning to submit a formal trade secret request and you want to make sure you understand the process required to do so.

HESI00471

In response to your phone call, Cindy Hafner forwarded you the summary document which described the process that we are looking for, but I wanted to see if you had any specific questions regarding it, or if you wanted to ensure that the process is captured in the steps listed in that document (or something else entirely)

Thanks and I apologize about any redundancy here. Just want to make sure we're on the same page.

Talk to you soon.

--
John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [<mailto:BRoot@mcguirewoods.com>]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County, Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

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Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Thursday, July 17, 2014 1:59 PM
To: Crist, John <John.Crist@epa.ohio.gov>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

John,

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Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412 667 7935 (Direct Line)
412 667.7959 (FAX)

broot@mcguirewoods.com

www.mcguirewoods.com

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From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

Good talking to you this morning. I wanted to make sure that we're on the same page with respect to what you are looking for. Essentially, your client (Halliburton) is planning to submit a formal trade secret request and you want to make sure you understand the process required to do so.

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Talk to you soon.

—

John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 10:42 AM

HESI00473

To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

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Chief Legal Counsel
Ohio EPA
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P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

HESI00474

From: Crist, John <John.Crist@epa.ohio.gov>
Sent: Thursday, July 17, 2014 2:58 PM
To: Root, Brian C <BRoot@mcguirewoods.com>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>, Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

No problem. Let me know if you have any other questions or if I can help further.

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 2:57 PM
To: Crist, John
Cc: Simcic, Peter; Fischbein, Ann
Subject: RE: GasPerm 1000 Trade Secret request

John,

Thank you for tracking down this information. I really appreciate it.

Thanks again,
Brian

From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 2:56 PM
To: Root, Brian C.
Cc: Simcic, Peter; Fischbein, Ann
Subject: RE: GasPerm 1000 Trade Secret request

Hey Brian,

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John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [mailto:BRoot@mcguirewoods.com]
Sent: Thursday, July 17, 2014 1:59 PM
To: Crist, John
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

John,

I just realized my contact information was not sent in my previous email. Here it is:

Brian C. Root

HESI00475

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667 7959 (FAX)

broot@mcguirewoods.com

www.mcguirewoods.com

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From: Crist, John [<mailto:John.Crist@epa.ohio.gov>]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian,

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john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [<mailto:BRoot@mcguirewoods.com>]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

HESI00476

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049
Columbus Ohio 43216-1049
614-644-2782
614-644-3184 f
614-562-5019 c

cindy.hafner@epa.ohio.gov

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Thursday, July 17, 2014 2:57 PM
To: Crist, John <John.Crist@epa.ohio.gov>
Cc: Simcic, Peter <Peter.Simcic@epa.ohio.gov>, Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Subject: RE: GasPerm 1000 Trade Secret request

John,

Thank you for tracking down this information. I really appreciate it.

Thanks again,
Brian

From: Crist, John [mailto:John.Crist@epa.ohio.gov]
Sent: Thursday, July 17, 2014 2:56 PM
To: Root, Brian C.
Cc: Simcic, Peter; Fischbein, Ann
Subject: RE: GasPerm 1000 Trade Secret request

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John Crist
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(614) 644-2844

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To: Crist, John
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

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625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667 7935 (Direct Line)
412.667 7959 (FAX)

broot@mcguirewoods.com

www.mcguirewoods.com

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HESI00478

From: Crist, John [<mailto:John.Crist@epa.ohio.gov>]
Sent: Thursday, July 17, 2014 1:23 PM
To: Root, Brian C.
Cc: Simcic, Peter
Subject: RE: GasPerm 1000 Trade Secret request

Brian.

Good talking to you this morning. I wanted to make sure that we're on the same page with respect to what you are looking for. Essentially, your client (Halliburton) is planning to submit a formal trade secret request and you want to make sure you understand the process required to do so.

In response to your phone call, Cindy Hafner forwarded you the summary document which described the process that we are looking for, but I wanted to see if you had any specific questions regarding it, or if you wanted to ensure that the process is captured in the steps listed in that document (or something else entirely).

Thanks and I apologize about any redundancy here. Just want to make sure we're on the same page.

Talk to you soon.

--

John Crist
john.crist@epa.ohio.gov
(614) 644-2844

From: Root, Brian C. [<mailto:BRoot@mcquirewoods.com>]
Sent: Thursday, July 17, 2014 10:42 AM
To: Crist, John
Subject: FW: GasPerm 1000 Trade Secret request

From: Hafner, Cynthia [<mailto:Cynthia.Hafner@epa.ohio.gov>]
Sent: Tuesday, July 08, 2014 11:51 AM
To: Dawn Robertson
Cc: Fischbein, Ann
Subject: GasPerm 1000 Trade Secret request

We understand that your company is interested in making a Trade Secret claim with respect to information in the MSDS sheet for Gas Perm 1000 in Ohio. This relates to a fire at a fracking well pad in Monroe County, Ohio. I attached a guidance sheet that explains the process and rules applicable to Trade Secret Claims in Ohio. You will need to make follow this in order to make a claim. Please have someone in your company make a formal claim. Ann will call you or any other contact you identify to us tomorrow morning to answer questions or assist with your claim.

Cynthia A. Hafner
Chief Legal Counsel
Ohio EPA
50 W. Town St., Ste. 700
P.O. Box 1049

HESI00479



Columbus Ohio 43216-1049

614-644-2782

614-644-3184 f

614-562-5019 c

cindy.hafner@epa.ohio.gov



HESI00480

From: Fischbein, Ann <Ann.Fischbein@epa.ohio.gov>
Sent: Sunday, July 27, 2014 9:17 AM
To: Root, Brian C <BRoot@mcguirewoods.com>
Subject: Trade Secret Follow-up question

Brian:

Has Halliburton claimed trade secret as to the constituents in GasPerm1000 to USEPA, ODNR, and/or Ohio's State Emergency Response Commission? If so, was the trade secret request granted? Thank you in advance for your prompt attention to this e-mail

Best Regards,
Ann

HESI00481



11

11



0



ALL STATE® LEGAL 800 222 0510 EDS11 RECYCLED

From: Billie.Suder@amwater.com
Sent: Wednesday, September 03, 2014 3:07 PM
To: Root, Brian C.
Subject: Re Halliburton Trade Secret Notification

Brian,

The letter has been signed and will be placed in the mail to you later this afternoon

Thanks,
Billie



WEST VIRGINIA
AMERICAN WATER

Billie J. Suder
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South
Weston, WV 26452
Office: (304) 269-2006 x 4
Internal: 7-257-1012
Fax: (304) 269-2232
Mobile: (304) 476-6228
E-mail: Billie.Suder@amwater.com

"The test of success is not what you do when you're on top. Success is how high you bounce when you hit bottom." General George S. Patton, Jr.

From "Root, Brian C." <BRoot@mcguirewoods.com>
To "Billie.Suder@amwater.com" <Billie.Suder@amwater.com>.
Date 09/02/2014 05:26 PM
Subject Halliburton Trade Secret Notification

Ms. Suder,

Please see the attached letter that we discussed on the telephone earlier today. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667.7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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[attachment "20140902152722704.pdf" deleted by Billie Suder/WVAWC/AWWSC]

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Tuesday, September 02, 2014 5:25 PM
To: Robert Francis@ky.gov
Subject: Halliburton. Trade Secret Notification
Attachments: 20140902152734964.pdf

Mr. Francis,

Please see the attached letter that we discussed on the telephone earlier today. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
P 667.7935 (Direct Line)
F 667 7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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McGuireWoods LLP
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Phone: 412.667.6000
Fax: 412.667.6050
www.mcguirewoods.com

Brian C. Root
Direct: 412 667 7935

McGUIREWOODS

broot@mcguirewoods.com
Direct Fax: 412.667.7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Robert Francis
Branch Manager, Environmental Response Branch, Kentucky Department for
Environmental Protection
Robert.Francis@ky.gov
Kentucky Department for Environmental Protection
100 Minuteman Parkway
Frankfort, KY 40601-6168

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Francis:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and the Kentucky DEP.

We write to confirm that you and the Kentucky DEP understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to the Kentucky DEP were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that the Kentucky DEP confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you did not share this formulation with anyone. However, if you did provide this information to anyone else, please provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

September 2, 2014
Page 2

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and the Kentucky DEP's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuire Woods LLP

THE FOREGOING IS CONFIRMED:

Kentucky Department for Environmental Protection

By: _____
Print Name

Its: _____

Date. _____

HESI2283

From: Root, Brian C <BRoot@mcguirewoods.com>
Sent: Friday, September 12, 2014 2:04 PM
To: Robert Francis@ky.gov
Subject: Trade Secret Disclosure

Mr. Francis,

Halliburton continues to await the executed confirmation that the KY DEP will not disclose Halliburton's trade secret information that it received from ORSANCO. During our telephone conversation on September 2, you stated that you were the only KY DEP representative that received Halliburton's trade secret information and that you did not disclose this information to anyone.

As we discussed, Halliburton is willing to cooperate with the KY DEP in the most expeditious way possible to protect its valuable proprietary information, but absent the prompt cooperation from the KY DEP you stated would be forthcoming, it will be forced to act unilaterally.

Please advise me of the KY DEP's position, or if counsel has been retained, have them contact me as soon as possible.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667.7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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From: Francis, Robert (EEC) <Robert.Francis@ky.gov>
Sent: Thursday, September 18, 2014 4:42 PM
To: Root, Brian C
Subject: RE: Halliburton: Trade Secret Notification
Attachments: 20140918161003955.pdf

Here you go. I am putting the hardcopy in the mail tonight and should go out tomorrow. Please advise if you need anything else.

Thanks.

Robert Francis, Branch Manager
Kentucky Department for Environmental Protection
Environmental Response Branch
300 Fair Oaks Lane
Frankfort, KY 40601
24 HR Spill Reporting Hotline: 1-800-928-2380
Office Phone: 502-564-2150



From: Root, Brian C. [<mailto:BRoot@mcguirewoods.com>]
Sent: Tuesday, September 02, 2014 5:25 PM
To: Francis, Robert (EEC)
Subject: Halliburton: Trade Secret Notification

Mr. Francis,

Please see the attached letter that we discussed on the telephone earlier today. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
25 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)

412.667 7959 (FAX)

broot@mcquirewoods.com

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Brian C. Root
Direct: 412 667 7935

McGUIREWOODS

brroot@mcguirewoods.com
Direct Fax: 412 667 7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Robert Francis
Branch Manager, Environmental Response Branch, Kentucky Department for
Environmental Protection
Robert.Francis@ky.gov
Kentucky Department for Environmental Protection
100 Minuteman Parkway
Frankfort, KY 40601-6168

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Francis:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and the Kentucky DEP.


We write to confirm that you and the Kentucky DEP understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to the Kentucky DEP were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that the Kentucky DEP confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you did not share this formulation with anyone. However, if you did provide this information to anyone else, please provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

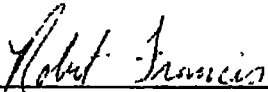
We greatly appreciate your and the Kentucky DEP's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED:



Kentucky Department for Environmental Protection

By: Robert Francis
Print Name

Its: Branch Manager

Date: 9/18/14

From: Root, Brian C. <BRoot@mcguirewoods.com>
Sent: Tuesday, September 02, 2014 5:23 PM
To: 'stanthewaterman@yahoo.com'
Subject: Halliburton Trade Secret Notification
Attachments: 20140902152746000.pdf

Mr. States,

Please see the attached letter that we discussed on the telephone last Friday. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667.7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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Brian C. Root
Direct: 412 667-7935

McGUIREWOODS

broot@mcguirewoods.com
Direct Fax: 412 667.7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Stanley States
stanthewaterman@yahoo.com
6433 Forward Ave.
Pittsburgh, PA 15217

Rc: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. States:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had on August 29, 2014.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you.

We write to confirm that you understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to you were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that you confirm your obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you did not share this formulation with anyone. However, if you did provide this information to anyone else, please provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

Please feel free to call me at 412 667.7935 if you have any questions related to this matter.

September 2, 2014
Page 2

We greatly appreciate your prompt attention to this very important matter:

Very truly yours,



Brian C. Root
McGuire Woods LLP

THE FOREGOING IS CONFIRMED:

Stanley States

Date: _____

HESI2291

From: Root, Brian C. <BRoot@mcguirewoods.com>
Sent: Tuesday, September 02, 2014 5:25 PM
To: 'Robert Francis@ky.gov'
Subject: Halliburton Trade Secret Notification
Attachments: 20140902152734964.pdf

Mr. Francis,

Please see the attached letter that we discussed on the telephone earlier today. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412.667.7935 (Direct Line)
412.667.7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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Brian C. Root
Direct: 412 667.7935

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broot@mcguirewoods.com
Direct Fax: 412 667 7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Robert Francis
Branch Manager, Environmental Response Branch, Kentucky Department for
Environmental Protection
Robert.Francis@ky.gov
Kentucky Department for Environmental Protection
100 Minuteman Parkway
Frankfort, KY 40601-6168

Rc: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Francis:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and the Kentucky DEP.

We write to confirm that you and the Kentucky DEP understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to the Kentucky DEP were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that the Kentucky DEP confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you did not share this formulation with anyone. However, if you did provide this information to anyone else, please provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

September 2, 2014
Page 2

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and the Kentucky DEP's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED:

Kentucky Department for Environmental Protection

By: _____
Print Name

Its: _____

Date: _____

From: Root, Brian C. <BRoot@mcguirewoods.com>
Sent: Tuesday, September 02, 2014 5:26 PM
To: 'Billie.Suder@amwater.com'
Subject: Halliburton: Trade Secret Notification
Attachments: 20140902152722704.pdf

Ms. Suder,

Please see the attached letter that we discussed on the telephone earlier today. A hard copy will follow by overnight mail.

Regards,
Brian

Brian C. Root
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
12.667.7935 (Direct Line)
12.667.7959 (FAX)
broot@mcguirewoods.com
www.mcguirewoods.com

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625 Liberty Avenue, 23rd Floor
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Phone 412 667 6000
Fax 412 667 6050
www.mcguirewoods.com

Brian C. Root
Direct 412 667.7935

McGUIREWOODS

broot@mcguirewoods.com
Direct Fax 412 667 7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Billic J. Suder
Billie.Suder@amwater.com
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South
Weston, WV 26452

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Ms. Suder:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and West Virginia American Water.

We write to confirm that you and West Virginia American Water understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to West Virginia American Water were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that West Virginia American Water confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you only forwarded MSDS information to your colleagues and representatives from the West Virginia Department of Health & Human Resources but you did not share GasPerm 1000's proprietary formulation with anyone. However, if you did provide this formulation to anyone else, please provide us

September 2, 2014
Page 2

with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this formulation without disclosing it to them.

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and West Virginia American Water's prompt attention to this very important matter.

Very truly yours,


Brian C. Root
McGuire Woods LLP

THE FOREGOING IS CONFIRMED:

West Virginia American Water

By: _____
Print Name

Its: _____

Date: _____

HESI2297

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, PA 15222-3142
Phone: 412.667.6000
Fax: 412.667.6050
www.mcguirewoods.com

Leonard J. Marsico
Direct: 412.667.7987

McGUIREWOODS

lmarsico@mcguirewoods.com
Direct Fax: 412.667.7956

August 22, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Jerry G. Schulte
jschulte@orsanco.org
Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Avenue
Cincinnati, OH 45230

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

I write as counsel to Halliburton Company and to confirm the detailed message I left you this morning.

We just learned that the Ohio EPA disclosed to you the formulation of Halliburton's proprietary product GasPerm 1000 in connection with the June 28 fire at the Eisenbarth Pad in Monroe County.

We write to confirm that you and ORSANCO understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosure of it to ORSANCO was also in confidence. The Ohio EPA is currently in the process of confirming the trade secret status of this formulation.

In light of the foregoing, we ask that ORSANCO confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter and that you provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

As I requested in my voicemail, please call me at 412.973.8982 when you receive this message so that we can discuss it further.

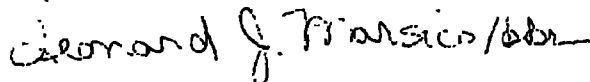
Atlanta | Austin | Baltimore | Brussels | Charlotte | Charlottesville | Chicago | Dallas | Houston | Jacksonville | London
Los Angeles | New York | Norfolk | Pittsburgh | Raleigh | Richmond | Tysons Corner | Washington, D.C. | Wilmington

HESI2298

August 22, 2014
Page 2

We greatly appreciate your and ORSANCO's prompt attention to this very important matter.

Very truly yours,



Leonard J. Marsico
McGuireWoods LLP

LJM/jab

cc: Ann Fischbein (by e-mail at Ann.Fischbein@epa.ohio.gov)
Cynthia Hafner (by e-mail at Cynthia.Hafner@epa.ohio.gov)
John Crist (by e-mail at John.Crist@epa.ohio.gov)

THE FOREGOING IS CONFIRMED:

ORSANCO

By: 

Its: Jerry G. Schulte

Print Name

Date: 8/29/14

HESI2299

From: Billie Suder@amwater.com
Sent: Tuesday, September 02, 2014 11:21 AM
To: Root, Brian C.
Subject: Fw: MSDS for BE 9
Attachments: BE 9 pdf

Follow Up Flag: Follow up
Flag Status: Flagged



WEST VIRGINIA
AMERICAN WATER

Billie J. Suder
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South
Weston, WV 26452
Office: (304) 269-2006 x 4
Internal: 7-257-1012
FAX: (304) 269-2232
Mobile: (304) 476-6228
E-mail: Billie.Suder@amwater.com

"The test of success is not what you do when you're on top. Success is how high you bounce when you hit bottom." General George S. Patton, Jr

----- Forwarded by Billie Suder/WVAWC/AWWSC on 09/02/2014 11:20 AM -----

From: Billie Suder/WVAWC/AWWSC
To: Jeffrey L McIntyre/WVAWC/AWWSC, Mark W LeChevallier/WQ/CORP/AWWSC, Matthew J Corson/ADMIN/CORP/AWWSC@AWW,
Walter.M.Ivey@wv.gov, j.d.douglas@wv.gov,
Date: 07/02/2014 10:30 AM
Subject: Fw: MSDS for BE 9

Additional information from ORSANCO



WEST VIRGINIA
AMERICAN WATER

Billie J. Suder
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South

Weston, WV 26452
Office: (304) 269-2006 x 4
Internal 7-257-1012
FAX: (304) 269-2232
Mobile: (304) 476-6228
E-mail: Billie.Suder@amwater.com

"The test of success is not what you do when you're on top. Success is how high you bounce when you hit bottom " General George S. Patton, Jr

----- Forwarded by Billie Suder/WVAWC/AWWSC on 07/02/2014 10:29 AM -----

From: Jerry Schulte <jschulte@orsanco.org>
To: Jerry Schulte <jschulte@orsanco.org>, Sandra Johnson <Sandra.Johnson@amwater.com>, Ashland Water <monk8874@yahoo.com>, Russell Water - Frank Stephenson <russellwaterplant@gmail.com>, Ryan Watts <ironlorwater@shcglobal.net>, Portsmouth Water <lab@post.ci.portsmouth.oh.us>, Laura Roberts <xena@zoomnet.net>, Portsmouth Water - Sam Sutherland <SSutherland@portsmouthoh.org>, Portsmouth Water <rakers@post.ci.portsmouth.oh.us>, Maysville Water - Greg England <maysvillewtp@gmail.com>, Jeff Vogt <Jeff.Vogt@qcww.cincinnati-oh.gov>, Mana Meyer <Mana.Meyer@qcww.cincinnati-oh.gov>, Rich Stuck <Richard.Stuck@qcww.cincinnati-oh.gov>, Verna Arnette <Verna.Arnette@qcww.cincinnati-oh.gov>, Renea Lohmann <Renea.Lohmann@cincww.rcc.org>, Billie.Suder@amwater.com, Jack Wang <jwang@lwcky.com>, Rengao Song <rsong@lwcky.com>, Nicole Estes <nestes@lwcky.com>.
Cc: Mike Sherron <Michael.Sherron@epa.state.oh.us>, "Eggert, Michael" <Michael.Eggert@epa.ohio.gov>, Bill Toomey <William.J.Toomey@wv.gov>, "Roney, Julie (EEC)" <Julie.Roney@ky.gov>, Jim Mehl <jim.mehl@epa.state.oh.us>, Mike Dorsey <Mike.H.Dorsey@wv.gov>, Peter Tennant <ptennant@orsanco.org>, Lisa Cochran <lcochran@orsanco.org>, Jason Heath <jheath@orsanco.org>, Melissa Mann <mmann@orsanco.org>, Travis Luncan <tluncan@orsanco.org>
Date: 07/02/2014 09:08 AM
Subject: FW: MSDS for BE 9

Jerry G. Schulte
Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Ave.
Cincinnati, Ohio 45230
www.orsanco.org
www.facebook.com/ORSANCO
Office: 513.231.7719 ext 104
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HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: BE-9

Revision Date: 16-Apr-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BE-9
Synonyms: None
Chemical Family: Solution
Application: Biocide

Manufacturer/Supplier Halliburton Energy Services, Inc.
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Tributyl tetradecyl phosphonium chloride	81741-28-8	5 - 10%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin burns. May cause respiratory irritation. May be harmful if swallowed May be harmful if inhaled

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth If breathing is difficult give oxygen. Get medical attention

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse Remove contaminated shoes and discard.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion If swallowed, do NOT induce vomiting. Give victim two glasses of water, Call a physician immediately Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways. Use water spray to cool fire exposed surfaces.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 0, Reactivity 0

HMIS Ratings: Health 3, Flammability 0, Physical Hazard 0, PPE F

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Wash hands after use. Launder contaminated clothing before reuse. Do NOT consume food, drink, or tobacco in contaminated areas.

Storage Information Store in a cool well ventilated area. Keep container closed when not in use. Store away from direct sunlight. Store in a dry location. Store in a manner to prevent commingling with incompatible materials. Store away from alkalis. Store away from reducing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715.2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Dust/mist respirator (N95, P2/P3)

Hand Protection	Impervious rubber gloves. Neoprene gloves Polyvinylchloride gloves.
Skin Protection	Wear impervious protective clothing, including boots, gloves, lab coat, apron, rain jacket, pants or coverall, as appropriate, to prevent skin contact
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Slight
pH:	6-8
Specific Gravity @ 20 C (Water=1):	0.95-1.00
Density @ 20 C (lbs./gallon):	8.12
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	212
Boiling Point/Range (C):	100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Miscible
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	55-65
Partition Coefficient/n-Octanol/Water:	< 3
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Reducing agents. Strong alkalis.
Hazardous Decomposition Products	Chlorine. Phosphorus acids Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
------------------------------------	---------------------------------

Symptoms related to exposure
Acute Toxicity

Inhalation
Eye Contact
Skin Contact
Ingestion

May cause respiratory irritation. May be harmful if inhaled.
May cause eye burns
May cause skin burns Harmful if absorbed through the skin
May be harmful if swallowed

Chronic Effects/Carcinogenicity

No data available to indicate product or components present at greater than 1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tributyl tetradecyl phosphonium chloride	81741-28-8	< 2000 mg/kg (Rat)	No data available	0.9 mg/L (Rat)

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:

LC50: (96 hour) 0.46 mg/L (Oncorhynchus mykiss)

LC50 (96 hour) 0.06 mg/l (Lepomis macrochirus)

LC50: (96 hour) 0.58 mg/l (fish)

Acute Crustaceans Toxicity:

TLM96 1.6 mg/l (Crangon crangon) TLM48 0.025 mg/l (Daphnia magna)

Acute Algae Toxicity:

Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Tributyl tetradecyl phosphonium chloride	81741-28-8	No information available	LC50(96h) 0.46 mg/L (Oncorhynchus mykiss) LC50(96h) 0.06 mg/L (Lepomis macrochirus)	No information available	EC50(48h) 0.025 mg/L (Daphnia magna) TLM96 1.6 mg/L (Crangon crangon)

12.2 Persistence and degradability

No information available

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations
Incineration recommended in approved incinerator according to federal, state, and local regulations.

Contaminated Packaging

Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

US DOT

UN Number:

UN2922

BE-9

Page 4 of 6

HESI2305

UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
NAERG: NAERG 154

US DOT Bulk
DOT (Bulk) Not Applicable

Canadian TDG ul0

UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

IMDG/IMO

UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
EMS: EmS F-A, S-B

IATA/ICAO

UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

Special Precautions for User None

Labels: Corrosive
Toxic

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable

EPA RCRA Hazardous Waste Classification

If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65

All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law

Does not apply

NJ Right-to-Know Law

Does not apply.

PA Right-to-Know Law

Does not apply.

Canadian Regulations

Canadian DSL Inventory

All components listed on inventory or are exempt

WHMIS Hazard Class

D1A Very Toxic Materials
E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS

Section 15. Regulatory Information

Additional information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

From: Billie.Suder@amwater.com
Sent: Tuesday, September 02, 2014 11:20 AM
To: Root, Brian C.
Subject: Fw: Monroe County - Statoil Incident - MSDS Information
Attachments: MSDS - LGC-36UC pdf, MSDS - SP Breaker pdf; MSDS - Hydrochloric Acid.pdf; MSDS - LCA-1 pdf; MSDS - Gas Perm 1000 pdf; MSDS - FR 66 pdf, MSDS - BE 9.pdf; MSDS - BC 140 pdf; MSDS - #2 Diesel pdf, MSDS - WG36 pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Mr. Root,

Per our conversation:

Jeffrey McIntyre 304-340-2000

Mark LeChevallier 856-727-6106

Matthew Corson 856-309-4561

Walter Ivey 304-356-4272

JD Douglas 304-356-4306

Regards,
Billie



WEST VIRGINIA
AMERICAN WATER

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"The test of success is not what you do when you're on top. Success is how high you bounce when you hit bottom." General George S. Patton, Jr

----- Forwarded by Billie Suder/WVAWC/AWWSC on 09/02/2014 11 15 AM -----

From Billie Suder/WVAWC/AWWSC
To Jeffrey L McIntyre/WVAWC/AWWSC, Mark W LeChevallier/WQ/CORP/AWWSC, Matthew J Corson/ADMIN/CORP/AWWSC@AWW,
Walter M Ivey@wv.gov, J D Douglas@wv.gov,
Date 07/02/2014 10 27 AM
Subject Fw Monroe County - Statoil Incident - MSDS Information

Additional information from ORSANCO - MSDS sheets for chemicals on site.



WEST VIRGINIA
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"The test of success is not what you do when you're on top. Success is how high you bounce when you hit bottom." General George S Patton, Jr

----- Forwarded by Billie Suder/WVAWC/AWWSC on 07/02/2014 10 26 AM -----

From Jerry Schulte <jschulte@orsanco.org>
To: Jerry Schulte <jschulte@orsanco.org>, Sandra Johnson@amwater.com, Ashland Water <monk8874@yahoo.com>, Russell Water - Frank Stephenson <russellwaterplant@gmail.com>, Ryan Watts <irononwater@sbcglobal.net>, Portsmouth Water <fab@post.ci.portsmouth.oh.us>, Laura Roberts <xena@zoomnet.net>, Portsmouth Water - Sam Sutherland <SSutherland@portsmouthoh.org>, Portsmouth Water <rakers@post.ci.portsmouth.oh.us>, Maysville Water - Greg England <maysvillewto@gmail.com>, Jeff Vogt <Jeff.Vogt@gcww.cincinnati-oh.gov>, Mana Meyer <Mana.Meyer@gcww.cincinnati-oh.gov>, Rich Stuck <Richard.Stuck@gcww.cincinnati-oh.gov>, Verna Arnette <Verna.Arnette@gcww.cincinnati-oh.gov>, Renea Lohmann <Renea.Lohmann@cincww.rcc.org>, Billie.Suder@amwater.com, Jack Wang <jwang@lwcky.com>, Rengao Song <rsong@lwcky.com>, Nicole Estes <nestes@lwcky.com>, Cc Mike Sherron <Michael.Sherron@epa.state.oh.us>, "Eggert, Michael" <Michael.Eggert@epa.ohio.gov>, Bill Toomey <William.J.Toomey@wv.gov>, "Roney, Julie (EEC)" <Julie.Roney@ky.gov>, Jim Mehl <jim.mehl@epa.state.oh.us>, Mike Dorsey <Mike.H.Dorsey@wv.gov>, Peter Tennant <ptennant@orsanco.org>, Lisa Cochran <lcochran@orsanco.org>, Jason Heath <jheath@orsanco.org>, Melissa Mann <mmann@orsanco.org>, Travis Luncan <tluncan@orsanco.org>
Date 07/02/2014 09:08 AM
Subject FW Monroe County - Statoil Incident - MSDS Information

Jerry G. Schulte
Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Ave
Cincinnati, Ohio 45230

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Mobile: 513.260.8249

MATERIAL SAFETY DATA SHEET

Product Trade Name: LGC-36 UC

Revision Date: 14-Feb-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LGC-36 UC
Synonyms: None.
Chemical Family: Blend
Application: Liquid Gel Concentrate
Manufacturer/Supplier: Halliburton Energy Services, Inc
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone. (281) 575-5000
Prepared By: Chemical Compliance
Telephone. 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	30 - 60%	Not applicable	Not applicable
Guar gum	9000-30-0	30 - 60%	10 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects May cause allergic respiratory reaction May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air If not breathing give artificial respiration, preferably mouth-to-mouth If breathing is difficult give oxygen Get medical attention

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes Get medical attention. Remove contaminated clothing and laundry before reuse

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention Never give anything by mouth to an unconscious person

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	180
Flash Point/Range (C):	82
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 1, Flammability 2, Reactivity 0

HMIS Ratings: Health 1, Flammability 2, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Not normally needed. But if significant exposures are possible then the following respirator is recommended.

Organic vapor respirator with a dust/mist filter (A2P2/P3)

Hand Protection Impervious rubber gloves

Skin Protection Normal work coveralls

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists

Other Precautions

Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Off white
Odor:	Mild hydrocarbon
pH:	6.5 - 7.5
Specific Gravity @ 20 C (Water=1):	1.086
Density @ 20 C (lbs./gallon):	9.05
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	392
Boiling Point/Range (C):	200
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	< 0.15
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame
Incompatibility (Materials to Avoid)	Strong oxidizers
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	May cause respiratory irritation. May cause allergic respiratory reaction. May cause chemical pneumonia. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation. Causes drying of the skin.
Eye Contact	May cause eye irritation.

Ingestion	Irritation of the mouth, throat, and stomach. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions
Aggravated Medical Conditions	Skin disorders
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
Other Information	None known
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
Not restricted in accordance with the terms and conditions of 49 CFR 173 120(b)(3)

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65 The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law One or more components listed

NJ Right-to-Know Law One or more components listed

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **SP BREAKER**

Revision Date: 20-Dec-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: SP BREAKER

Synonyms: None

Chemical Family: Oxidant

Application: Breaker

Manufacturer/Supplier: Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium persulfate	7775-27-1	60 - 100%	0.1 mg/m ³	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause allergic skin and respiratory reaction. May cause eye irritation. Oxidizer.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Oxidizer May ignite combustibles Decomposition in fire may produce toxic gases

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 1, Flammability 0, Reactivity 1
HMIS Ratings: Health 1, Flammability 0, Physical Hazard 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing Avoid creating or inhaling dust. Avoid dust accumulations

Storage Information Store away from combustibles Store in a cool well ventilated area. Keep container closed when not in use Product has a shelf life of 12 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Localized ventilation should be used to control dust levels

Respiratory Protection Dust/mist respirator (N95, P2/P3)

Hand Protection Butyl rubber gloves

Skin Protection Rubber apron

Eye Protection Dust proof goggles

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

Color: White
Odor: Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	6
Specific Gravity @ 20 C (Water=1):	2.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft ³):	84.3
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	35
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	238.1

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Avoid contact with readily oxidizable materials.
Incompatibility (Materials to Avoid)	Avoid halogens. Contact with acids. Strong alkalis. Combustible materials.
Hazardous Decomposition Products	Oxides of sulfur. Oxygen. Sulfuric acid.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause allergic respiratory reaction.
Skin Contact	May cause an allergic skin reaction.
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach.
Aggravated Medical Conditions	Lung disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	LD50 895 mg/kg (Rat)
Dermal Toxicity:	LD50 > 10000 mg/kg (Rabbit)

Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Readily biodegradable
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	This bag may contain residue of a hazardous material. Some authorities may regulate such containers as hazardous waste. Dispose of container according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1505, Sodium Persulfate, 5 1, III
NAERG 140

Canadian TDG

Sodium Persulfate, 5 1, UN1505, III

ADR

UN1505, Sodium Persulfate, 5 1, III

Air Transportation

ICAO/IATA

UN1505,Sodium Persulfate, 5 1, III

Sea Transportation

IMDG

UN1505,Sodium Persulfate, 5 1, III
EmS F-A, S-Q

Other Transportation Information

Labels: Oxidizer

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	C Oxidizing Materials D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: HYDROCHLORIC ACID 10-30%

Revision Date: 19-Apr-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: HYDROCHLORIC ACID 10-30%

Synonyms: None

Chemical Family: Inorganic acid

Application: Solvent

Manufacturer/Supplier: Halliburton Energy Services
P O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrochloric acid	7647-01-0	10 - 30%	2 ppm	5 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory burns. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards May form explosive mixtures with strong alkalis. Decomposition in fire may produce toxic gases. Reaction with steel and certain other metals generates flammable hydrogen gas. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 3, Flammability 0, Reactivity 1
HMIS Ratings: Health 3, Flammability 0, Reactivity 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from alkalis. Store in a cool well ventilated area. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Acid gas respirator

Hand Protection Impervious rubber gloves

Skin Protection Full protective chemical resistant clothing. Rubber boots

Eye Protection Chemical goggles, also wear a face shield if splashing hazard exists

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Clear colorless
Odor:	Pungent acid
pH:	0.8
Specific Gravity @ 20 C (Water=1):	1.16
Density @ 20 C (lbs./gallon):	9.66
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	230
Boiling Point/Range (C):	110
Freezing Point/Range (F):	-50
Freezing Point/Range (C):	-46
Vapor Pressure @ 20 C (mmHg):	26
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	35
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	36.5

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong alkalis
Hazardous Decomposition Products	Flammable hydrogen gas Chlorine Hydrogen sulfide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	Causes severe respiratory irritation
Skin Contact	May cause skin burns
Eye Contact	May cause eye burns
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders
Chronic Effects/Carcinogenicity	Prolonged, excessive exposure may cause erosion of the teeth
Other Information	None known
Toxicity Tests	
Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity:	LC50 3124 ppm/1 hr (Rat)
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1789,Hydrochloric Acid Solution, 8, II
RQ (Hydrochloric Acid - 2273 kg)
NAERG 157

Canadian TDG

Hydrochloric Acid Solution, 8, UN1789, II

ADR

UN1789,Hydrochloric Acid Solution, 8, II

Air Transportation

ICAO/IATA

UN1789,Hydrochloric Acid Solution, 8, II

RQ (Hydrochloric Acid - 2273 kg.)

Sea Transportation

IMDG

UN1789, Hydrochloric Acid Solution, 8, II

RQ (Hydrochloric Acid - 2273 kg.)

EmS F-A, S-B

Other Transportation Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).

EPA CERCLA/Superfund Reportable Spill Quantity EPA Reportable Spill Quantity is 1592 Gallons based on Hydrochloric acid (CAS: 7647-01-0)

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of

Corrosivity D002

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law One or more components listed

NJ Right-to-Know Law One or more components listed

PA Right-to-Know Law One or more components listed

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt

WHMIS Hazard Class E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

MATERIAL SAFETY DATA SHEET

Product Trade Name: LCA-1

Revision Date: 22-Jul-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: LCA-1
Synonyms: None
Chemical Family: Organic hydrocarbon
Application: Solvent

Manufacturer/Supplier: Halliburton Energy Services, Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Paraffinic solvent		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. Combustible.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes: Immediately flush eyes with large amounts of water for at least 30 minutes. Seek prompt medical attention.

Ingestion: Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	176
Flash Point/Range (C):	80
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	0.5
Flammability Limits in Air - Upper (%):	4.9

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam.

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Closed containers may explode in fire. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 2, Reactivity 0

HMIS Ratings: Health 1, Flammability 2, Physical Hazard 0 . PPE: X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Remove ignition sources and work with non-sparking tools. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid breathing vapors. Avoid breathing mist. Wash hands after use. Launder contaminated clothing before reuse. Avoid contact with eyes, skin, or clothing. Ground and bond containers when transferring from one container to another.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep from heat, sparks, and open flames. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Not normally needed. But if significant exposures are possible then the following respirator is recommended:

Organic vapor respirator with a dust/mist filter

Hand Protection Impervious rubber gloves

Skin Protection Normal work coveralls

Eye Protection

Chemical goggles, also wear a face shield if splashing hazard exists.

Other Precautions

Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	0.813
Density @ 20 C (lbs./gallon):	6.68
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	392
Boiling Point/Range (C):	200
Freezing Point/Range (F):	-49
Freezing Point/Range (C):	-45
Vapor Pressure @ 20 C (mmHg):	0.3
Vapor Density (Air=1):	7.1
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	3.04
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause chemical pneumonia. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	Causes drying of the skin. May cause moderate skin irritation.
Eye Contact	May cause eye irritation

Ingestion	Irritation of the mouth, throat, and stomach. Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Skin disorders. Eye ailments. Respiratory disorders.
Chronic Effects/Carcinogenicity	The full refining history is known and it can be shown that the production substance is not carcinogen, therefore the classification as a carcinogen need not apply.
Other Information	None known.
Toxicity Tests	
Oral Toxicity:	LD50: > 2000 mg/kg (Rat)
Dermal Toxicity:	LD50: > 2000 mg/kg (Rabbit)
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
Not restricted in accordance with the terms and conditions of 49 CFR 173.120(b)(3).

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA

California Proposition 65 All components listed do not apply to the California Proposition 65 Regulation.

MA Right-to-Know Law Does not apply

NJ Right-to-Know Law Does not apply

PA Right-to-Know Law Does not apply.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

WHMIS Hazard Class B3 Combustible Liquids
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

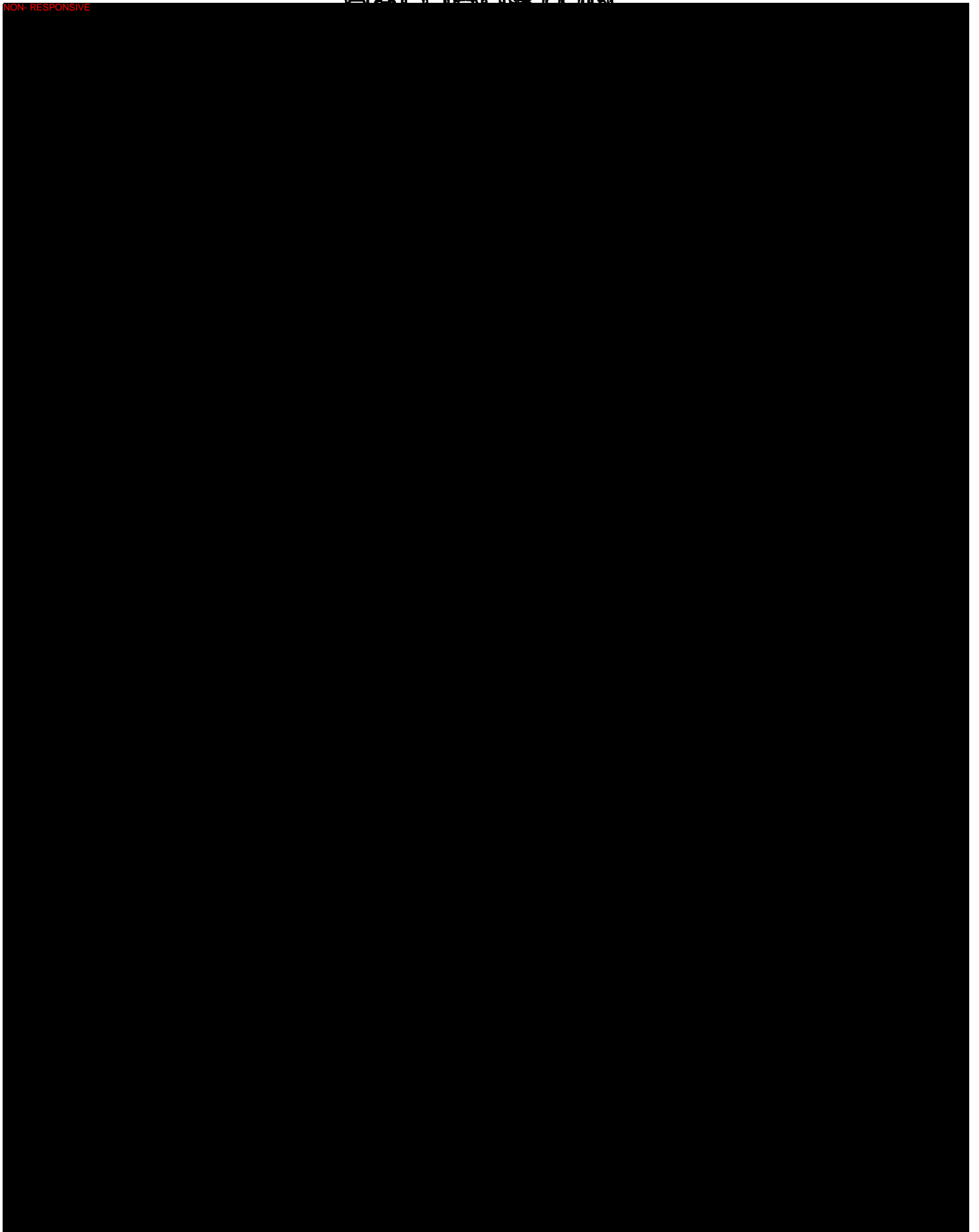
Disclaimer Statement

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*****END OF MSDS*****

HALLIBURTON

NON-RESPONSIVE

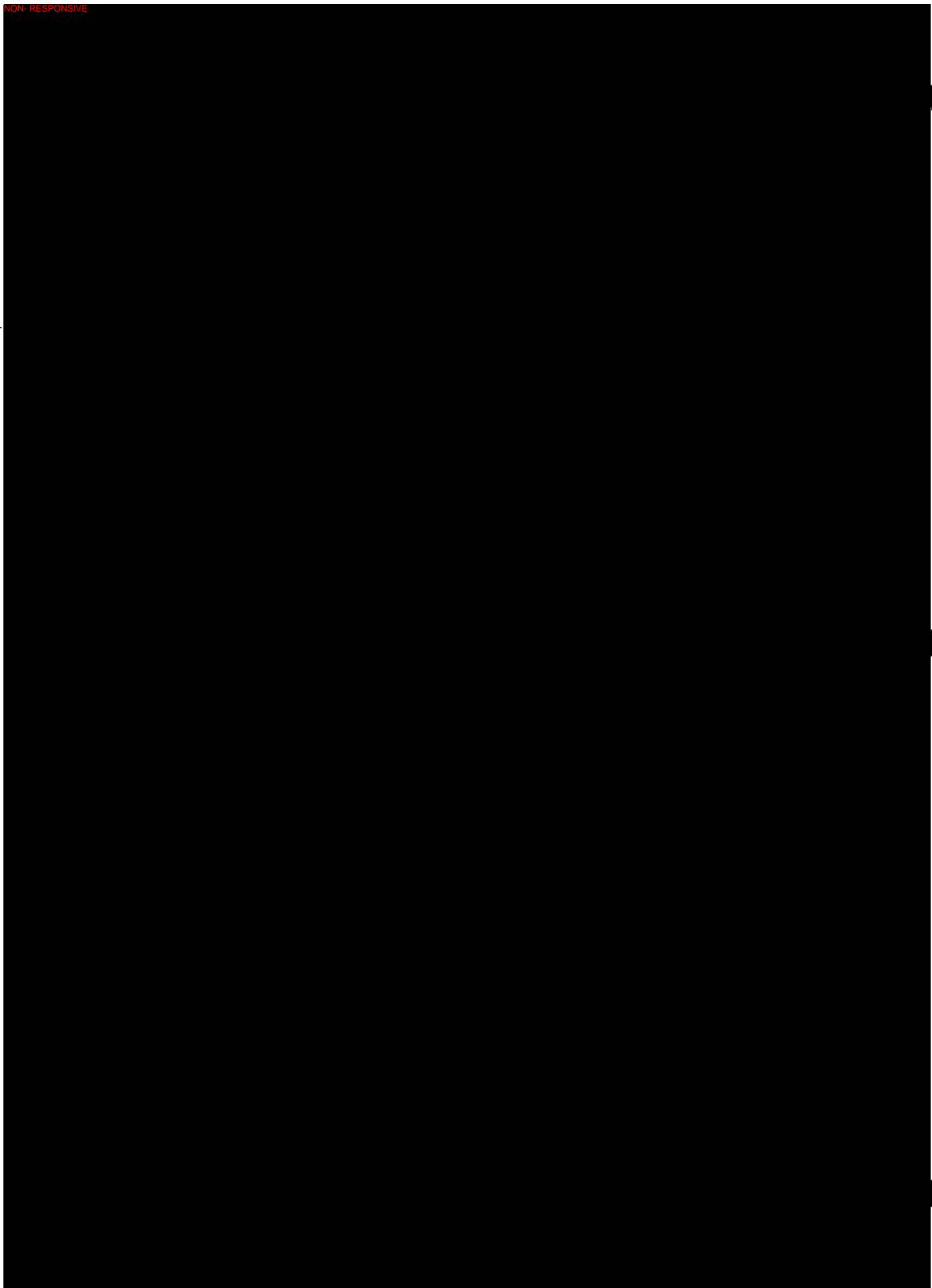


NON-RESPONSIVE

HESI2336

NON-RESPONSIVE

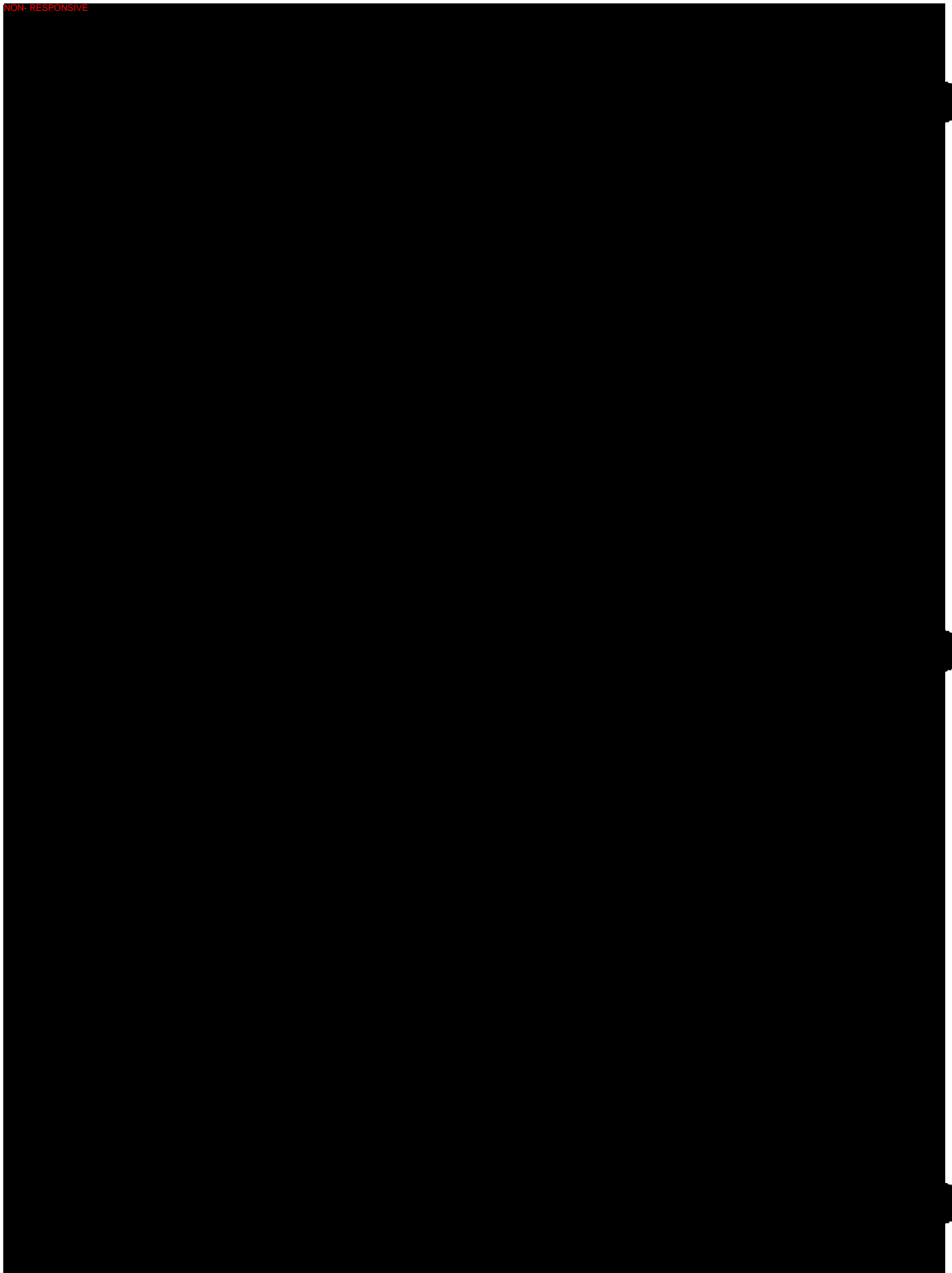
HESI2337



NON-RESPONSIVE

HESI2339

NON-RESPONSIVE



NON-RESPONSIVE

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FR-66**

Revision Date: 14-Feb-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FR-66
Synonyms: None
Chemical Family: Blend
Application: Friction Reducer

Manufacturer/Supplier Halliburton Energy Services
 P O Box 1431
 Duncan, Oklahoma 73536-0431
 Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
 Telephone: 1-580-251-4335
 e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye irritation May be harmful if swallowed

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200
Flash Point/Range (C):	> 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	> 419
Autoignition Temperature (C):	> 215
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases Use water spray to cool fire exposed surfaces

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 1, Flammability 0, Reactivity 0

HMIS Ratings: Health 1, Flammability 0, Physical Hazard 0 , PPE C

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe Contain spill with sand or other inert materials Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use Launder contaminated clothing before reuse Material is slippery underfoot Avoid breathing mist

Storage Information Store away from oxidizers Keep container closed when not in use Store in a cool, dry location Store in a well ventilated area Keep from freezing. Product has a shelf life of 6 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area Local exhaust ventilation should be used in areas without good cross ventilation

Respiratory Protection Not normally needed But if significant exposures are possible then the following respirator is recommended
Organic vapor respirator

Hand Protection Impervious rubber gloves

Skin Protection Rubber apron

Eye Protection Chemical goggles, also wear a face shield if splashing hazard exists

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White
Odor:	Sweet hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.06
Density @ 20 C (lbs./gallon):	8.83
Bulk Density @ 20 C (lbs/ft3):	65.4
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	< 14
Freezing Point/Range (C):	< -10
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	50
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen Carbon monoxide and carbon dioxide. Chlorine
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	Inhalation of mist or heated vapors may cause respiratory irritation
Skin Contact	May cause skin defatting with prolonged exposure.
Eye Contact	May cause moderate eye irritation
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal
Aggravated Medical Conditions	None known
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards
Other Information	None known

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335
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Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BE-9**

Revision Date: 16-Apr-2014

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BE-9
Synonyms: None
Chemical Family: Solution
Application: Biocide

Manufacturer/Supplier Halliburton Energy Services, Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Tnbutyl tetradecyl pnosphonium chloride	81741-28-8	5 - 10%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and skin burns. May cause respiratory irritation May be harmful if swallowed. May be harmful if inhaled

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen Get medical attention

Skin Wash with soap and water Get medical attention if irritation persists Remove contaminated clothing and launder before reuse. Remove contaminated shoes and discard.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing

Ingestion If swallowed, do NOT induce vomiting Give victim two glasses of water, Call a physician immediately Never give anything by mouth to an unconscious person

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways. Use water spray to cool fire exposed surfaces.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 0, Reactivity 0

HMIS Ratings: Health 3, Flammability 0, Physical Hazard 0, PPE: F

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Wash hands after use. Launder contaminated clothing before reuse. Do NOT consume food, drink, or tobacco in contaminated areas.

Storage Information Store in a cool well ventilated area. Keep container closed when not in use. Store away from direct sunlight. Store in a dry location. Store in a manner to prevent commingling with incompatible materials. Store away from alkalis. Store away from reducing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Dust/mist respirator. (N95, P2/P3)

Hand Protection	Impervious rubber gloves. Neoprene gloves. Polyvinylchloride gloves
Skin Protection	Wear impervious protective clothing, including boots, gloves, lab coat, apron, rain jacket, pants or coverall; as appropriate, to prevent skin contact.
Eye Protection	Chemical goggles, also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Slight
pH:	6-8
Specific Gravity @ 20 C (Water=1):	0.95-1.00
Density @ 20 C (lbs./gallon):	8.12
Bulk Density @ 20 C (lbs/ft³):	Not Determined
Boiling Point/Range (F):	212
Boiling Point/Range (C):	100
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Miscible
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	55-65
Partition Coefficient/n-Octanol/Water:	< 3
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Reducing agents. Strong alkalis
Hazardous Decomposition Products	Chlorine Phosphorus acids. Carbon monoxide and carbon dioxide
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
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Symptoms related to exposure
Acute Toxicity

Inhalation
Eye Contact
Skin Contact
Ingestion

May cause respiratory irritation May be harmful if inhaled
May cause eye burns
May cause skin burns Harmful if absorbed through the skin
May be harmful if swallowed

Chronic Effects/Carcinogenicity

No data available to indicate product or components present at greater than 1% are chronic health hazards

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tributyl tetradecyl phosphonium chloride	81741-28-8	< 2000 mg/kg (Rat)	No data available	0.9 mg/L (Rat)

12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity: LC50: (96 hour) 0.46 mg/L (Oncorhynchus mykiss)
LC50 (96 hour) 0.06 mg/l (Lepomis macrochirus)
LC50 (96 hour) 0.58 mg/l (fish)
Acute Crustaceans Toxicity: TLM96: 1.6 mg/l (Crangon crangon) TLM48: 0.025 mg/l (Daphnia magna)
Acute Algae Toxicity: Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Tributyl tetradecyl phosphonium chloride	81741-28-8	No information available	LC50(96h): 0.46 mg/L (Oncorhynchus mykiss) LC50(96h): 0.06 mg/L (Lepomis macrochirus)	No information available	EC50(48h): 0.025 mg/L (Daphnia magna) TLM96: 1.6 mg/L (Crangon crangon)

12.2 Persistence and degradability

No information available

12.3 Bioaccumulative potential

No information available

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method

Disposal should be made in accordance with federal, state, and local regulations.
Incineration recommended in approved incinerator according to federal, state, and local regulations

Contaminated Packaging

Follow all applicable national or local regulations

14. TRANSPORT INFORMATION

US DOT

UN Number:

UN2922

UN Proper Shipping Name: Corrosive Liquid, Toxic, N O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
NAERG: NAERG 154

US DOT Bulk
DOT (Bulk) Not Applicable

Canadian TDG ul0
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O S (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

IMDG/IMO
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II
EMS: EmS F-A, S-B

IATA/ICAO
UN Number: UN2922
UN Proper Shipping Name: Corrosive Liquid, Toxic, N.O.S. (contains Tributyl Tetradecyl Phosphonium Chloride)
Transport Hazard Class(es): 8
Subsidiary Hazard: (6.1)
Packing Group: II

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

Special Precautions for User None

Labels: Corrosive
Toxic

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable.

EPA RCRA Hazardous Waste Classification

If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65

All components listed do not apply to the California Proposition 65 Regulation

MA Right-to-Know Law

Does not apply

NJ Right-to-Know Law

Does not apply.

PA Right-to-Know Law

Does not apply

Canadian Regulations

Canadian DSL Inventory

All components listed on inventory or are exempt.

WHMIS Hazard Class

D1A Very Toxic Materials
E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Section 15 Regulatory Information

Additional information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: BC-140

Revision Date: 20-Dec-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BC-140
Synonyms: None
Chemical Family: Blend
Application: Crosslinker

Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Monoethanolamine borate	26038-87-9	30 - 60%	Not applicable	Not applicable
Ethylene glycol	107-21-1	10 - 30%	100 mg/m ³	50 ppm CEIL

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation May cause headache, dizziness, and other central nervous system effects May be harmful if swallowed. May cause birth defects Repeated overexposure may cause liver and kidney effects

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth If breathing is difficult give oxygen. Get medical attention

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes Get medical attention Remove contaminated clothing and launder before reuse

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing

Ingestion Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention Never give anything by mouth to an unconscious person

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel

NFPA Ratings: Health 2, Flammability 0, Reactivity 0

HMIS Ratings: Health 2, Flammability 0, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse

Storage Information Store away from oxidizers Store in a cool well ventilated area. Keep container closed when not in use Product has a shelf life of 36 months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator

Hand Protection Impervious rubber gloves

Skin Protection Rubber apron

Eye Protection Chemical goggles, also wear a face shield if splashing hazard exists

Other Precautions Eyewash fountains and safety showers must be easily accessible

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark green
Odor:	Mild

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	7.28
Specific Gravity @ 20 C (Water=1):	1.17 - 1.2
Density @ 20 C (lbs./gallon):	9.75 - 10.0
Bulk Density @ 20 C (lbs/ft ³):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers Dehydrating agents.
Hazardous Decomposition Products	Toxic fumes Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness
Skin Contact	May cause skin irritation.
Eye Contact	May cause severe eye irritation
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea May cause heart, kidney and brain disorders
Aggravated Medical Conditions	Skin disorders Eye ailments Liver and kidney disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause kidney damage. Prolonged or repeated exposure may cause liver, heart, blood and brain damage Prolonged or repeated exposure may cause reproductive system damage. Prolonged or repeated exposure may cause embryo and fetus toxicity
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Ethylene Glycol//107-21-1
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 1674 Gallons based on Ethylene glycol (CAS: 107-21-1)
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed
PA Right-to-Know Law	One or more components listed

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D1A Very Toxic Materials D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

MSDSDefinition
of terms**Material Safety Data Sheet for #2 Diesel****1. Chemical Product****MSDS Number:** U7770**MSDS Date:** 01-31-99**Product Name:** #2 Diesel Fuel

24 Hour Emergency Phone: (210) 979-8346
Transportation Emergencies: Call Chemtrec at 1-800-424-9300
MSDS Assistance (210) 592-4593

Distributors Name and Address:

T.W. Brown Oil Co., Inc.
1857 Knoll Drive
Ventura, California 93003

Chemical Name: #2 Diesel Fuel**Cas Number:** 68476-34-6

Synonyms/Common Names: This Material Safety Data Sheet applies to the following product descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product, and are not reflected in this document. Consult specification sheets for technical information.

California Air Resources Board (Carb) Diesel Fuel- On-road, Off-Road, Tax Exempt blends

Premium Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

#2 Distillate- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

#2 Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

#2 Fuel Oil- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

2. Composition, Information On Ingredients

Product Use: This product is intended for use as a fuel in engines and heaters designed for diesel fuels, and for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

Description: #2 Diesel is a complex mixture of hydrocarbons from a variety of chemical processes blended to meet standardized product specifications. Composition varies greatly and includes C9 to C20 hydrocarbons with a boiling range of about 325-675 degrees F. The following is a non-exhaustive list of common components, typical percentage ranges in product, and occupational exposure limits for each.

Component or Material Name	%	CAS Number	ACGIH Limits	OSHA Exposure Limits
			TLV - STEL - Units	PEL - STEL - C/P - Units
Cat cracked distillate, light	0-100	64741-59-9	100 - NA - mg/m3	N/A - N/A - N/A - N/A
Hydrotreated distillate, middle	0-100	64742-46-7	100 - NA - mg/m3	N/A - N/A - N/A - N/A

Hydrotreated distillate, light	0-100	64742-47-8	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Gas oil, light	0-100	64741-44-2	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A

3. Hazards Identification

Health Hazard Data:

1. The major effect of exposure to this product is giddiness, headache, central nervous system depression; possible irritation of eyes, nose, and lungs, and dermal irritation. Signs of kidney and liver damage may be delayed. Pulmonary irritation secondary to exhalation of solvent.
2. NIOSH recommends that whole diesel engine exhaust be regarded as a potential occupational carcinogen. Follow OSHA and NSHA rules where diesel engine exhaust fumes may be generated.
3. A life time skin painting study by the American Petroleum Institute has shown that similar naphtha products with a boiling range of 350-700 degrees F usually produce skin tumors and/ or skin cancers in laboratory mice. Only a weak to moderate response occurred. The effect to humans has not been determined.
4. Positive results at 2.0 ml/kg and 6.0 ml/kg noted in mutagenesis studies via in-vivo bone marrow cytogenetics assay in rats.
5. Kerosene is classified as a severe skin irritant. Mutation data has been reported for kerosene products. Hydrotreated kerosene is listed as being probably carcinogenic to humans with limited evidence in humans and sufficient evidence in experimental animals.

Hazards of Combustion Products: Carbon monoxide and carbon dioxide can be found in the combustion products of this product and other forms of hydrocarbon combustion. Carbon monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well ventilated areas.

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HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WG-36 GELLING AGENT**

Revision Date: 07-Oct-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WG-36 GELLING AGENT

Synonyms: None

Chemical Family: Polysaccharide

Application: Gelling Agent

Manufacturer/Supplier: Halliburton Energy Services
P O Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT (w/w)	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause mild eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin: Wash with soap and water. Get medical attention if irritation persists.

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion: Under normal conditions, first aid procedures are not required.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined Min: > 200
Flash Point/Range (C):	Not Determined Min: > 93
Flash Point Method:	COC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended.
Dust/mist respirator (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Off white
Odor:	Bean
pH:	6.5-7.5
Specific Gravity @ 20 C (Water=1):	1.42 -1.47
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation

Symptoms related to exposure

Acute Toxicity

Inhalation	May cause respiratory irritation May cause allergic respiratory reaction
Eye Contact	May cause eye irritation.
Skin Contact	None known
Ingestion	None known

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards.

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
------------	------------	-----------	-------------	-----------------

Contains no hazardous substances	Mixture	No data available	No data available	No data available
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12. ECOLOGICAL INFORMATION

Ecotoxicological Information

Ecotoxicity Product

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Ecotoxicity Substance

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Contains no hazardous substances	Mixture	No information available	No information available	No information available	No information available

12.2 Persistence and degradability

Readily biodegradable

12.3 Bioaccumulative potential

Does not bioaccumulate

12.4 Mobility in soil

No information available

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Other adverse effects

13. DISPOSAL CONSIDERATIONS

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR

Not restricted

Air Transportation

ICAO/IATA

Not restricted

Sea Transportation

IMDG

Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372)
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this SDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335
------------------------	--

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

From: Marsico, Leonard J <LMarsico@mcguirewoods.com>
Sent: Monday, August 25, 2014 3:45 PM
To: jschulte@orsanco.org
Cc: Root, Brian C.; Muhl, Anne G.
Subject: RE: Halliburton GasPerm 1000 Trade Secret Notification

Jerry,

Many thanks for speaking with me today. We appreciate ORSANCO's willingness to maintain Halliburton's formulation of it GASPerm 1000 confidential.

Per your request, I have confirmed that certain specific chemical names and their CAS's numbers that are contained in or make up Halliburton products are legally protected trade secrets, and that this is the case here. While their general chemical family may sometimes be known, the more specific information is protected. In fact, since our call, we have just learned that the Ohio EPA has confirmed and agrees that the information Halliburton disclosed to it in this matter, and which it disclosed to you, constitutes a trade secret fully protected under Ohio law.

Further to our conversation, I confirm that when the Ohio EPA disclosed it to you they advised you that it is confidential; that ORSANCO has only disclosed it on a need to know basis with the water authorities in its area of responsibility; that you will provide me with the contact information for each party to whom you disclosed it so I may confirm with them that they must maintain it in confidence; that ORSANCO will not disclose the information to any other parties; and that you will confirm with your ED who at ORSANCO will execute our confirmation of these facts.

I look forward to closing the loop on these very important matters and greatly appreciate your and ORSANCO's cooperation and professionalism.

Regards,

Len

Leonard J. Marsico
Chair, Complex Commercial Litigation Department
McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, Pennsylvania 15222
412 667 7987 (Direct Line)
412 667 7956 (FAX)
lmarsico@mcguirewoods.com
www.mcguirewoods.com

This e-mail may contain confidential or privileged information. If you are not the intended recipient, please advise by return e-mail and delete immediately without reading or forwarding to others.

From: Robbins, Bonnie B.
Sent: Friday, August 22, 2014 4:59 PM
To: jschulte@orsanco.org
Cc: ann.fischbein@epa.ohio.gov; cynthia.hafner@epa.ohio.gov; john.crist@epa.ohio.gov; Marsico, Leonard J.
Subject: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

Please see the letter from counsel for Halliburton Company. A hard copy will follow by overnight mail.

Bonnie Robbins

Bonnie B. Robbins

Legal Secretary to Ronald W. Crouch, Brad A. Funari, Laura A. Lange, Jamie A. Edwards and Melissa S. Liskey

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625 Liberty Avenue, 23rd Floor

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brobbs@mcguirewoods.com

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Subject: RE: Halliburton GasPerm 1000 Trade Secret Notification

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Len

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Sent: Friday, August 22, 2014 4:59 PM
To: jschulte@orsanco.org
Cc: ann.fischbein@epa.ohio.gov; cynthia.hafner@epa.ohio.gov; john.crist@epa.ohio.gov; Marsico, Leonard J.
Subject: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

Please see the letter from counsel for Halliburton Company. A hard copy will follow by overnight mail.

Bonnie Robbins

Bonnie B. Robbins

Legal Secretary to Ronald W. Crouch, Brad A. Funari, Laura A. Lange, Jamie A. Edwards and Melissa S. Liskey

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From: Robbins, Bonnie B <brobbins@mcguirewoods.com>
Sent: Friday, August 22, 2014 4:59 PM
To: jschulte@orsanco.org
Cc: ann.fischbein@epa.ohio.gov, cynthia.hafner@epa.ohio.gov, john.cnst@epa.ohio.gov, Marsico, Leonard J.
Subject: Halliburton GasPerm 1000 Trade Secret Notification
Attachments: Active_59733451_1_8_22_14 Letter to Jerry G Schulte.PDF

Dear Mr. Schulte:

Please see the letter from counsel for Halliburton Company. A hard copy will follow by overnight mail.

Bonnie Robbins

Bonnie B. Robbins

Legal Secretary to Ronald W Crouch, Brad A Funari, Laura A Lange, Jamie A Edwards and Melissa S. Liskey
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Leonard J. Marsico
Direct: 412 667 7987

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lmarsico@mcguirewoods.com
Direct Fax: 412 667 7956

August 22, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Jerry G. Schulte

jschulte@orsanco.org

Manager, Source Water Protection and Emergency Response
Ohio River Valley Water Sanitation Commission, ORSANCO
5735 Kellogg Avenue
Cincinnati, OH 45230

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Schulte:

I write as counsel to Halliburton Company and to confirm the detailed message I left you this morning.

We just learned that the Ohio EPA disclosed to you the formulation of Halliburton's proprietary product GasPerm 1000 in connection with the June 28 fire at the Eisenbarth Pad in Monroe County.

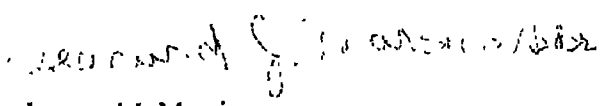
We write to confirm that you and ORSANCO understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosure of it to ORSANCO was also in confidence. The Ohio EPA is currently in the process of confirming the trade secret status of this formulation.

In light of the foregoing, we ask that ORSANCO confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter and that you provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

As I requested in my voicemail, please call me at 412.973.8982 when you receive this message so that we can discuss it further.

We greatly appreciate your and ORSANCO's prompt attention to this very important matter.

Very truly yours,


Leonard J. Marsico
McGuireWoods LLP

IJM/jab

cc: Ann Fischbein (by e-mail at Ann.Fischbein@epa.ohio.gov)
Cynthia Hafner (by e-mail at Cynthia.Hafner@epa.ohio.gov)
John Crist (by e-mail at John.Crist@epa.ohio.gov)

THE FOREGOING IS CONFIRMED:

ORSANCO

By: _____

Its: _____
Print Name

Date: _____

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
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Phone: 412 667 6000
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Brian C. Root
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Direct Fax: 412.667 7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Billic J. Suder
Billie.Suder@amwater.com
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South
Weston, WV 26452

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Ms. Suder:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and West Virginia American Water.

We write to confirm that you and West Virginia American Water understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to West Virginia American Water were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that West Virginia American Water confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you only forwarded MSDS information to your colleagues and representatives from the West Virginia Department of Health & Human Resources but you did not share GasPerm 1000's proprietary formulation with anyone. However, if you did provide this formulation to anyone else, please provide us

September 2, 2014
Page 2

with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this formulation without disclosing it to them.

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and West Virginia American Water's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED:

West Virginia American Water

By: _____
Print Name

Its: _____

Date: _____

HESI2376

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September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Billie J. Suder
Billie.Suder@amwater.com
Manager, Water Quality & Environmental Compliance
West Virginia American Water
1243 US Highway 19 South
Weston, WV 26452

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Ms. Suder:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and West Virginia American Water.

We write to confirm that you and West Virginia American Water understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to West Virginia American Water were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that West Virginia American Water confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you only forwarded MSDS information to your colleagues and representatives from the West Virginia Department of Health & Human Resources but you did not share GasPerm 1000's proprietary formulation with anyone. However, if you did provide this formulation to anyone else, please provide us


September 2, 2014
Page 2

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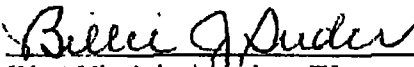
Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and West Virginia American Water's prompt attention to this very important matter.

Very truly yours,


Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED:


West Virginia American Water

By: Billie J. Suder
Print Name

Its: Manager, WQ+EC

Date: 9-3-14

HESI2378

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September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Robert Francis
Branch Manager, Environmental Response Branch, Kentucky Department for
Environmental Protection
Robert.Francis@ky.gov
Kentucky Department for Environmental Protection
100 Minuteman Parkway
Frankfort, KY 40601-6168

Rc: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Francis:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and the Kentucky DEP.

We write to confirm that you and the Kentucky DEP understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to the Kentucky DEP were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

In light of the foregoing, we ask that the Kentucky DEP confirm its obligation to maintain this formulation in confidence by execution of a copy of this letter. ORSANCO has already executed and returned a copy of a letter confirming the same with it as well. During our conversation, you stated that you did not share this formulation with anyone. However, if you did provide this information to anyone else, please provide us with the names of any persons or entities to which the formula has been provided up until now. Please also advise me immediately of any request by any party for this information without disclosing it to them.

September 2, 2014
Page 2

Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

We greatly appreciate your and the Kentucky DEP's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED.

Kentucky Department for Environmental Protection

By: _____
Print Name

Its: _____

Date: _____

McGuireWoods LLP
625 Liberty Avenue, 23rd Floor
Pittsburgh, PA 15222-3142
Phone 412.667.6000
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Direct Fax: 412.667.7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Robert Francis
Branch Manager, Environmental Response Branch, Kentucky Department for
Environmental Protection
Robert.Francis@ky.gov
Kentucky Department for Environmental Protection
100 Minuteman Parkway
Frankfort, KY 40601-6168

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. Francis:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had today.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you and the Kentucky DEP.

We write to confirm that you and the Kentucky DEP understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to the Kentucky DEP were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

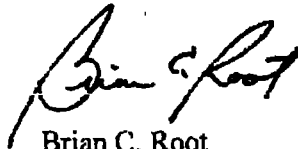
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September 2, 2014
Page 2

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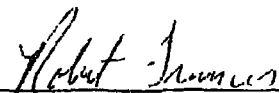
We greatly appreciate your and the Kentucky DEP's prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuireWoods LLP

THE FOREGOING IS CONFIRMED:



Kentucky Department for Environmental Protection

By: Robert Francis
Print Name

Its: Branch Manager

Date: 7/18/14

HESI2382

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Direct Fax: 412 667 7959

September 2, 2014

VIA E-MAIL AND FEDERAL EXPRESS

Stanley States
stanthewaterman@yahoo.com
6433 Forward Ave.
Pittsburgh, PA 15217

Re: Halliburton GasPerm 1000 Trade Secret Notification

Dear Mr. States:

I write as counsel to Halliburton Company and to confirm the telephone conversation that we had on August 29, 2014.

In response to the June 28 fire at the Eisenbarth Pad in Monroe County, Halliburton disclosed the formulation of its proprietary product GasPerm 1000 to the Ohio EPA. Thereafter, the Ohio EPA disclosed this proprietary formulation to ORSANCO and then ORSANCO disclosed this proprietary information to you.

We write to confirm that you understand that Halliburton's disclosure of this formulation to Ohio EPA was in confidence because this formulation is a legally protected trade secret, and that, accordingly, the disclosures of it to ORSANCO and to you were also in confidence. The Ohio EPA has reviewed the formulation for GasPerm 1000 and determined that it constitutes a trade secret.

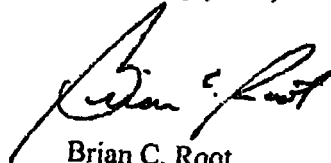
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Please feel free to call me at 412.667.7935 if you have any questions related to this matter.

September 2, 2014
Page 2

We greatly appreciate your prompt attention to this very important matter.

Very truly yours,



Brian C. Root
McGuire Woods LLP

THE FOREGOING IS CONFIRMED:


Stanley States

Date: 13 Sept. 2014

HESI2384